United States Department of Agriculture

Forest Service

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Final Environmental Impact Statement

Black Mesa Vegetation Management Project

USDA Forest Service
Rocky Mountain Region
Rio Grande National Forest
Divide Ranger District
Hinsdale and Mineral Counties, Colorado

Black Mesa Vegetation Management Project

Final Environmental Impact Statement

Divide Ranger District, Rio Grande National Forest
Hinsdale & Mineral Counties, Colorado

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This document is available on the internet at:
http://www.fs.usda.gov/projects/riogrande/landmanagement/projects

ABSTRACT: This Final Environmental Impact Statement (FEIS) evaluates the potential effects of the short-term benefits of salvaging timber stands being killed by spruce beetle and the need for long-term regeneration of the future forest, implementing fuel reduction treatments adjacent to private land, and managing hazard trees that may damage infrastructure in the Black Mesa project area. It reveals the direct, indirect, and cumulative effects of a proposed action and alternative actions for vegetation management in this analysis area. This document follows the format established in the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations {CFR} Parts 1500-1508). It includes a discussion of the need for the proposal, alternatives to the proposal, the impacts of the proposed action and alternatives, and a listing of agencies and persons consulted. It is tiered to the 1996 Revised Land and Resource Management Plan, as amended (Forest Plan) for the Rio Grande National Forest and the Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) issued for the Forest Plan.

SUMMARY

Purpose

Currently much of the high elevation portions of Hinsdale and Mineral Counties are experiencing extensive mortality of Engelmann spruce (*Picea engelmannii*) trees resulting from epidemic spruce beetle (*Dendroctonus rufipennis*) populations. Based on aerial detection surveys, spruce beetles have infested over 208,000 "footprint" acres of spruce/fir stands in these counties since 2005. It is expected tree mortality will continue until the mature Engelmann spruce trees are dead in these counties.

The Black Mesa Vegetation Management Project Environmental Impact Statement (EIS) evaluates the potential effects of salvaging dead and dying spruce to recover economic value in the short term, but also evaluates the long term desired condition to ensure these stands are regenerated to meet desired species composition, distribution, and stocking standards. The project area is located on National Forest System lands about 15 miles west of Creede, Colorado and north of the Rio Grande Reservoir. The majority of the project area is located in Hinsdale County; the southeast corner of the project area is in Mineral County. The Black Mesa project analysis area includes approximately 49,046 total acres; it is bordered on the south by the Forest Service Road (FSR) 520 recreation corridor and the Weminuche wilderness; the west side follows a ridgeline to the North Clear Creek drainage, then north along private land, to the Continental Reservoir, and FSR 513. The east boundary follows State Highway 149. The analysis area also includes several private in-holdings with structures and associated utility corridors.

The Forest Service has prepared this Final EIS in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. It provides the responsible official with the information necessary to make an informed decision about whether or not to authorize some level of action on all, part, or none of the analysis area. The decision will be documented in a Record of Decision (ROD) accompanying the Final EIS after receiving and considering the public comments received on the Draft EIS.

Choice among Alternatives

Three alternatives were considered in response to issues identified. The EIS discloses the expected direct, indirect, and cumulative effects of a proposed action and alternative action for vegetation management in the Black Mesa analysis area. Each action alternative was designed to be viable and consistent with Forest Plan direction. The action alternatives propose varying degrees of treatments which include salvage harvesting, forest stand regeneration activities, fuels reduction adjacent to private land, and hazard tree removal to protect infrastructure. Project Design Criteria are incorporated in each action alternative to protect other resources. Alternative 2 is the proposed action and is considered the preferred alternative.

Major Conclusions

When evaluating effects between the alternatives, it was found that the No Action alternative would likely have the fewest short-term effects for most resources, though there could be long-term effects as dead trees fall and impede movement. Fuel loadings would continue to increase, adding to high severity fire potential over time. No Action would not benefit the local logging industry. The Action alternatives would have short-term disturbance effects during harvest activities to wildlife and other Forest users. There could be some positive benefit to local industry. Mid to long-term, there is low risk for any adverse effects to resources.

Accelerated stand regeneration would be positive in the long-term for all resources. Reducing potential fuel loading would minimize the risk for widespread high severity fires in the analysis area.

Areas of Controversy

No major areas of controversy were identified during scoping. Concerns were expressed by some over the number of acres proposed for harvest, but others expressed the concern that the agency should be doing more, since so many trees are dead and dying.

Issues raised by Agencies and Public

Concerns identified during scoping included the potential effects on wildlife habitat, watershed health, soils, scenery, recreation, and local communities. These preliminary issues were evaluated to determine whether they were already resolved through land use designations, implementation of Forest Plan standards and guidelines and Best Management Practices (BMP's), project-specific design criteria, through processes or analyses routinely conducted by the Interdisciplinary Team (IDT or ID Team), or were beyond the scope of the project. All concerns that fell within these categories were considered resolved.

Issues to be Resolved

Concerns that would have to be addressed through spatial location of activities or that would drive (or partially drive) an alternative were considered unresolved. These unresolved concerns were developed into key issues. Two key issues were identified for this analysis. These issues are addressed and resolved in this analysis through the development of project design criteria, monitoring measures, and two alternatives to the proposed action.

Table of Contents

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

1.1 Document Structure

The Forest Service has prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Final EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- ***Chapter 1. Purpose and Need for Action:*** This chapter includes information on the history of the project, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. It also summarizes relevant direction from the Rio Grande National Forest (RGNF) Revised Land and Resource Management Plan, as amended (hereafter referred to as the Forest Plan [USDA Forest Service 1996]).
- ***Chapter 2. Alternatives, including the Proposed Action:*** This chapter provides a more detailed description of the agency's proposed action as well as alternatives for achieving the stated purpose. These alternatives were developed based on key issues raised by the public. This discussion also includes any Design Criteria or mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- ***Chapter 3. Affected Environment and Environmental Consequences*:** This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.
- ***Chapter 4. Consultation and Coordination:*** This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- ***Appendices:*** The appendices provide additional information related to the analysis including comments received during the Notice and Comment period on the Draft EIS (DEIS) and Agency responses to the comments.

Additional documents, including more detailed analyses for some of the project-area resources, may be found in the project planning record maintained by the Divide Ranger District, Rio Grande National Forest.

1.2 Project Location

As shown in figure 1-1, the proposed Black Mesa Vegetation Management Project (Black Mesa Project) area is located on National Forest System lands about 15 miles west of Creede, Colorado and north of the Rio Grande Reservoir. The majority of the project area is located in Hinsdale County; the southeast corner of the project area is in Mineral County.

The project analysis area includes approximately 49,046 total acres; it is bordered on the south by the Forest Service Road (FSR) 520 recreation corridor and the Weminuche wilderness; the west side follows a ridgeline to the North Clear Creek drainage, then north along private land, to the Continental Reservoir, and FSR 513. The east boundary follows State Highway 149.

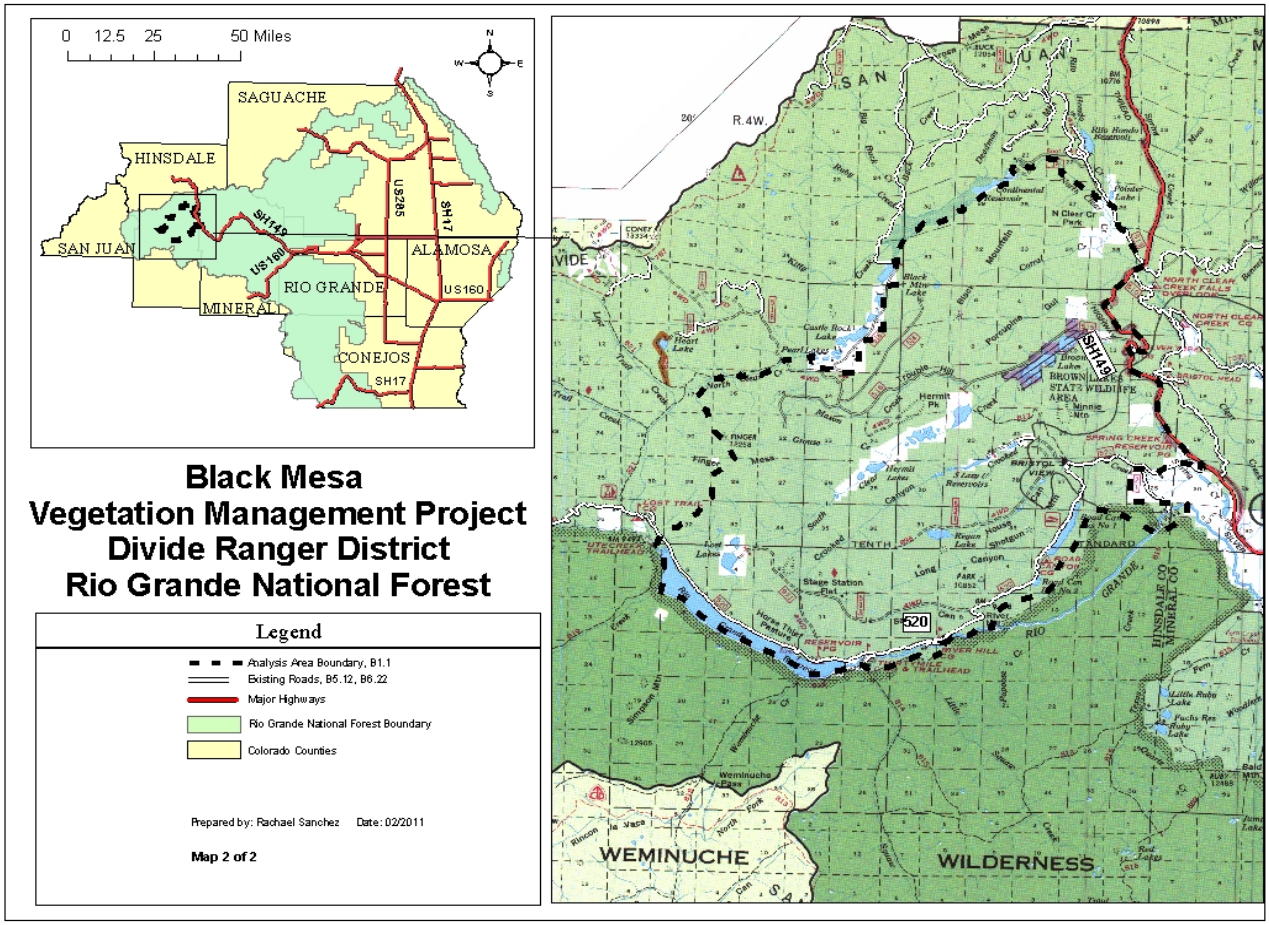


Figure 1-1. Black Mesa Project vicinity map and analysis area

Legal description for the analysis area is: T 40 N, R 4 W, Sec. 1-5, 8-15; T. 40 N, R 3W, Sec. 3 - 9, 17, 18; T 41N, R 4W, Sec. 1, 12-17, 20-29, 31-36; T 41N, R 3W, Sec 2-34; T 41N, R 2W, Sec. 19, 30: T 42N, R 3W, Sec. 20-22, 26-36; T 42N, R 4W, Sec. 36, New Mexico P.M.

1.3 Background

Currently much of the high elevation portions of Hinsdale and Mineral Counties are experiencing extensive mortality of Engelmann spruce (*Picea engelmannii*) trees resulting from epidemic spruce beetle (*Dendroctonus rufipennis)* populations. Aerial surveys completed by the Forest Service's Forest Health Protection Service Center out of Gunnison, CO have shown spruce beetles have infested over 208,000 "footprint" acres of spruce in these counties since 2005[1]. Figure 1-2, shows the aerial extent of cumulative spruce beetle mortality mapped from 2005 through 2011. Based on current beetle population trends and movement, it is expected that mortality will continue until the majority of mature Engelmann spruce trees are dead in these counties.

[1] Spruce beetle detection by aerial surveys underestimates actual acres infested, since spruce *fade* over 2 to 3 years compared to distinctly changing colors like pines. Ground surveys have found many more acres infested across the District.

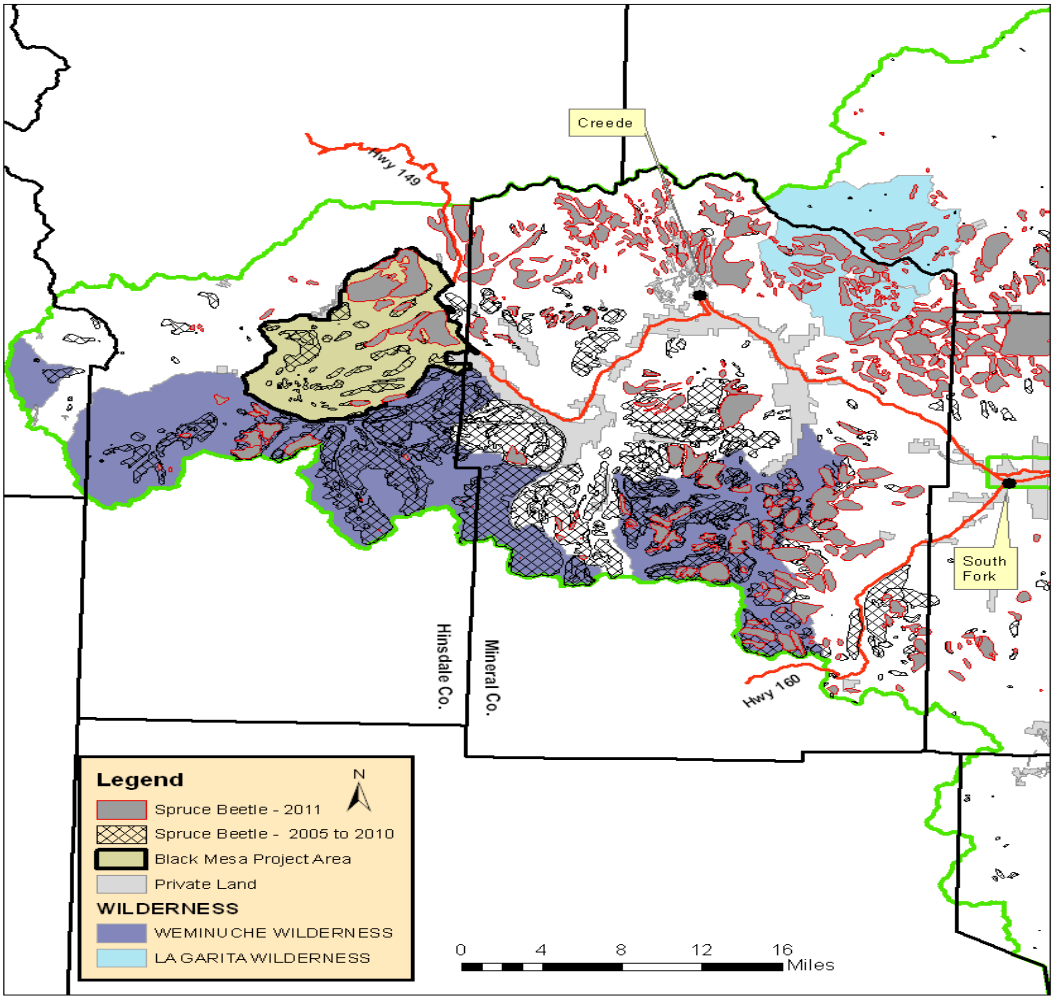


Figure 1-2. Aerial spruce beetle tree mortality extent 2005 through 2011. Hinsdale and Mineral Counties, Rio Grande National Forest

Forested vegetation in the project area consists primarily of mature Engelmann spruce dominated stands along relatively flat plateaus or "fingers" separated by steep-sided drainages. Aspen or other species dominate the drier south and west aspects. Blue spruce (*Picea pungens*) is found along major drainages, mixed with aspen and some Engelmann spruce. The mature spruce stands on the flat areas or steep north or east aspects have been prime habitat for continued growth of epidemic spruce beetle populations. Blue spruce has been less affected by spruce beetles, to date.

Spruce beetle activity was initially detected in the Black Mesa analysis area by aerial surveys in 2005 when tree mortality was mapped in 10 areas, affecting about 2100 acres; infestation levels ranged from 1 to 20 trees per acre. Mortality rates seemed to decline for the next several years, but populations continued to build in the Weminuche Wilderness to the south. By 2009, aerial surveys had mapped dying spruce in most stands south and east of the analysis area. Figure 2-1 in chapter 2, shows the aerial extent of spruce mortality in the project area, as of the summer of 2011.

1.4 Purpose and Need for Action

Due to the extensive spruce mortality in the Black Mountain vicinity to south of the Stage Station Flat area, the purpose and need for the Black Mesa Project is to: maximize economic recovery; reduce potential public safety hazards and the potential for damage to existing infrastructure; reduce the continuous extent of fuel buildup, including adjacent to private lands; and implement reforestation treatments to promote diversity in regenerating stands.

Project objectives are to:

- Salvage dead or dying trees while the value remains high in stands designated for multiple use management and are part of the suitable timber base.
- Regenerate treated portions of the forested acres killed by bark beetles in order to accelerate the rate of forest and ecological recovery over the long term.
- Treat potential hazard trees in areas of concentrated public use, along private property, roads, and other infrastructure.
- Reduce the accumulation of large diameter fuels in areas severely impacted by the spruce beetle, especially those adjacent to private land.
- Utilize the existing transportation network as much as possible to minimize both resource impacts and road construction costs.
- Provide forest and wood products, such as fuelwood, sawtimber or house logs, to the people of the San Luis Valley and/or other areas.

1.5 Forest Plan Direction

This proposal responds to the desired conditions and objectives as described in the Forest Plan, Rio Grande National Forest Land and Resource Management Plan (USDA Forest Service 1996, as amended) and moves the project area toward desired conditions described in that plan. This EIS is tiered to the Forest Plan Final EIS. Forest Plan desired conditions and objectives for this analysis are listed in table 1-1. Objectives are "concise projections of measurable, time-specific intended outcomes. The objectives for a plan are the means of measuring progress toward achieving or maintaining desired conditions (36 CFR 219.7(a)(2)(ii))."

The Forest Plan FEIS addresses concerns about forest health and the potential for spruce beetle epidemics (FEIS pp. 3-219 to 3-221). Forest-wide objectives include reducing insect and disease infestations and using a range of silvicultural prescriptions to achieve ecosystem management objectives (Forest Plan p. II-3). The Forest Plan FEIS also addresses the demonstrated and ongoing demand for wood and miscellaneous forest products such as firewood and poles (FEIS p. 3-159). Any regulated timber harvest activities would occur on lands classified as suitable for timber production, as per the Timber Suitability amendment to the Forest Plan (3/2/2000).

Table 1-1. Forest Plan Desired Conditions (goals) and objectives for this project (Forest Plan pgs. I-1 to II-6)

Forest-wide Desired Conditions	Forest-wide Objectives
Vegetative structure on the Forest is capable of sustaining timber harvesting that supplies wood products for humankind while providing for biological diversity of those forested areas. Harvest operations are designed to emulate smaller-scale disturbance events or processes.	2.2. Manage the Forest to maintain or improve the health and vigor of all native plant associations. 2.8. Treat aspen stands to maintain or improve wildlife and scenic values

Table 1-1. Forest Plan Desired Conditions (goals) and objectives for this project (Forest Plan pgs. I-1 to II-6)

Forest-wide Desired Conditions	**Forest-wide Objectives**
The amount, arrangement, and continuity of live and/or dead material, which would contribute to fire spread (fuel profiles), are consistent with land uses and estimates of historic fire regimes.	2.10 Use appropriate vegetative-management methods to modify unacceptable fuel profiles and reduce potentially unacceptable future high-intensity wildfires.
Special forest products, such as firewood…continue to be available from the Forest… The Forest recognizes the needs of people from the San Luis Valley and surrounding areas, and strives to meet their needs for forest and wood products, while protecting those resources for future generations.	3.2. Emphasize long-term sustainable production of resources for economies, communities, and people. 3.3. Use a range of silvicultural prescriptions to achieve ecosystem management objectives. These objectives may include supplying forage for wildlife, reducing insect and disease infestations, maintaining or improving aspen stands, or enhancing scenery. 3.4. Use existing roads, instead of constructing new ones.
Provide for scenic quality and a range of recreational opportunities that respond to the needs of Forest customers and local communities.	4.1 Provide natural appearing landscapes with diverse scenery, and increase access to recreation opportunities in attractive settings. Meet scenic integrity objectives as described in the Forest Plan.
Improve the financial efficiency of all programs and projects.	6.2. Manage, as much as practicable, the Forest's market oriented programs (timber, range, minerals, and special uses), so that they are financially profitable.
Emphasize cooperation with individuals, organizations, and other agencies while coordinating planning and project implementation.	7.1. Cooperate with all people, including those whose livelihood is dependent on National Forest resources, in the development of plans and projects. 7.2. Cooperate with federal, state, local, and tribal governments, as well as private organizations and individuals, to: promote rural-development efforts…reduce loss of wildlands and structures to wildfires.
Promote rural development.	8.1 Be a leader in working with rural people and communities including American Indian tribes, to develop opportunities and enterprise that contribute to their economic and social vitality. 8.2 Recognize the nature and extent of local economic dependencies on National Forest activities. Give special attention to resources that help diversify rural economies.
General Infrastructure.	Facilities are safe, accessible …. as needed to achieve resource management objectives. Forest work programs are conducted within the guidelines of the National Health and Safety Codes and the Occupational Safety and Health Administration.

The Forest Plan assigned land areas that are designated to be managed for a particular emphasis or theme known as Management Area Prescriptions (MAPs). Each MAP in the Forest Plan includes a description of the theme and physical setting, along with a description of the desired future conditions for that area, along with a list of Standards and Guidelines that apply and that are used during project implementation to help achieve Forest Plan desired conditions and objectives. Table 1-2 lists the Forest Plan MAPs within the project area, along with acres of other land ownerships. Figure 1-3 shows the spatial arrangement of the MAPs, private and other lands, and major infrastructure.

Table 1-2. Land allocations and MAPs, Black Mesa project area

Forest Plan MAP	MAP Theme description	Acres
2.2 – *Research Natural Area*	Protecting or enhancing unique or exemplary ecosystems designated for non-manipulative research, monitoring, education and/or maintenance of biodiversity.	2,529
3.3 – Backcountry	Maintain plant and animal habitats that are shaped primarily through natural processes, and to provide backcountry experiences to the public in areas where there is little evidence of human activities.	5,008
3.4 - Designated and Eligible Scenic Rivers	Scenic River corridors are managed to protect and perpetuate river segments that are either eligible for Scenic River designation, or are already so designated.	215
4.21 – Scenic Byways or Railroads[1]	Protect or preserve the scenic or recreation values and uses within designated Scenic Byways or Scenic RR corridors, while managing multiple-use values of the landscape.	1,788
4.3 – Developed and Dispersed Recreation[1]	Managed with emphasis on a wide range of recreation settings and opportunities within various landscapes.	4,223
4.4 – National River System, Recreation Eligible	Protect and perpetuate designated or eligible Recreation River segments.	682
5.13 – Forest Products[1]	Allow a full range of activities, with emphasis on the production of commercial wood products. Numerous open roads offer commercial access and roaded recreation opportunities, while restricted roads offer non-motorized recreation opportunities.	31,691
Subtotal		***46,136***
Other Lands		
Private Land		*2,221*
State Wildlife Area		*689*
Total Acres		***47,046***

[1]MAP included in the suitable timber base.

Additional information on the MAPs and Forest Plan goals and objectives can be reviewed in the Forest Plan online at: http://www.fs.usda.gov/main/riogrande/landmanagement/planning.

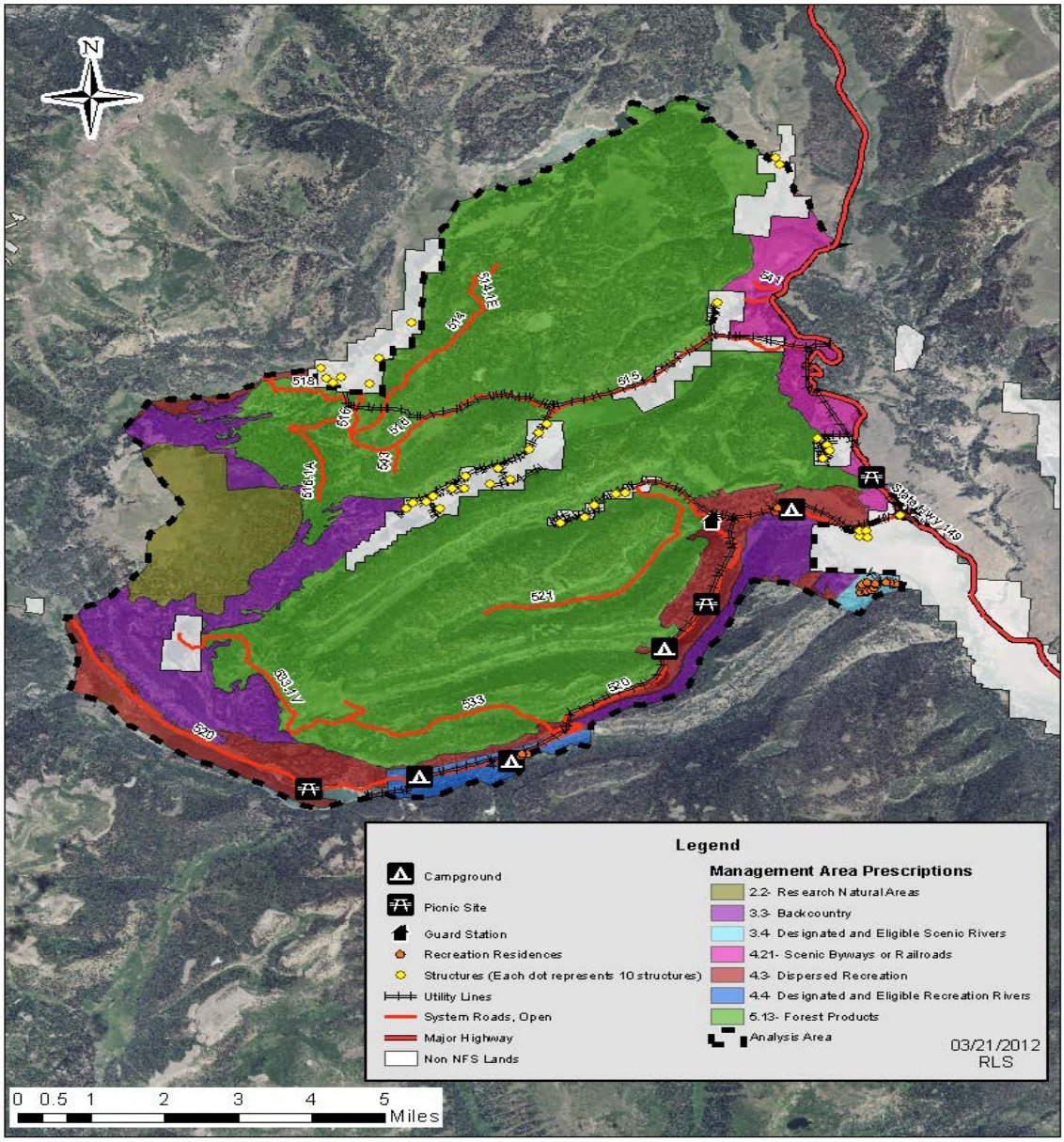


Figure 1-3. Major developed recreation sites, infrastructure, and Forest Plan MAPs.

1.6 Other Relevant Laws, Policy, Direction

All land management decisions are governed by an array of laws and policy which direct or provide bounds for decisions. While some laws and policy provide constraints, others provide intent and direction for certain actions to occur.

Where consistent with other Forest Plan goals and objectives, there is Congressional intent to allow timber harvesting on suitable lands (*Organic Administration Act of 1897, Multiple-Use Sustained-Yield Act of 1960; Forest and Rangeland Renewable Resources Planning Act of 1974; Federal Land Policy and Management Act of 1976; National Forest Management Act of 1976).* Intent is also expressed to allow the salvage of dead timber (*Forest and Rangeland*

Renewable Resources Planning Act of 1974). Such actions are also directed and authorized by Federal Regulation (*36 CFR 221.3; 36 CFR 223).* In keeping with these intents, it is Forest Service policy to provide timber resources to the local and regional economy (*Forest Service Manual [FSM] 2402; Forest Plan, pp. II-3 through II-4)*, salvage dead trees (*FSM 2435)*, and treat stands experiencing insect or disease infestations or to prevent infestations (*Forest Plan IV-25 through IV-28)*.

Silviculturally, salvage harvest is typically considered an Intermediate harvest. However, when tree mortality is so extensive that the stand is being returned to a regenerated stage, the prescribed harvest is then described as a regeneration harvest (FSM 2470 – Silvicultural Practices, section 2471.3). Since mortality of the mature Engelmann spruce stands in the Black Mesa project is generally 90 percent or greater (refer to chapter 3, Timber Management), a salvage harvest would be considered the final removal. Therefore, any salvage harvest would be coded as a type of regeneration harvest based on what best describes the residual stand characteristics.

1.7 Proposed Action

In response to the purpose and need for action, the Forest proposes to salvage and regenerate approximately 9,410 acres of beetle infested Engelmann spruce stands. Trees would be harvested only on slopes less than 40 percent and suitable for ground-based logging equipment. Dead and dying spruce 8 inches diameter breast height (dbh) and larger would be considered for harvest. All or part of cut trees would be skid to designated landings. Tons per acre of expected large diameter fuels would be decreased on treated acres.

Most of the proposed harvest areas would be accessible with the existing transportation system. Other roads needed include: up to 2 miles of Forest Service Road (FSR) 543 would be relocated since it is currently too steep for logging trucks to use safely; construction of about 3.6 miles of new temporary road segments, and maintenance and use of about 5.4 miles of old, non-system roads from previous harvests. As per Forest Service direction (FSM 7703.24), following the completion of project activities, all new temporary road segments and old, non-system roads would be closed and decommissioned. National Forest System (NFS) roads currently open or closed to public motorized travel would not change.

Following harvest activities, treated areas would be surveyed to evaluate the health, species composition, and distribution of residual trees. Areas not meeting desired forest stocking, composition, or distribution levels would be hand planted with Engelmann spruce seedlings. Exact planting acres would be determined with stocking surveys following harvest, but it is estimated that about 1,740 acres would be planted. Following harvest, stands with a substantial aspen component would be evaluated to determine the desirability of planting Engelmann spruce seedlings versus allowing aspen to dominate over a longer time period in some stands or parts of stands (estimated at 2,415 acres). If aspen regeneration was insufficient, these acres would also be artificially planted.

Hazard tree removal would be implemented within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins, or other infrastructure. Hazard distance would depend on localized factors such as slope, topography, and/or the number and arrangement of potentially hazardous trees. Where feasible, these trees would be cut and removed as part of timber harvest activities or removed as firewood by adjacent landowners; otherwise they would be felled, bucked, and left in place, unless needed to be removed to meet other resource objectives.

To improve defensible space, fuel reduction treatments would be implemented in Wildland-Urban Interface (WUI) areas up to 400 feet from adjacent private land or other structures on approximately 436 acres. These treatments would focus on thinning understory trees (<8 inches dbh) and shrubs, as needed to modify potential fire behavior. Treatments could consist of cutting vegetation with chainsaws and handpiling slash or grinding it with mechanized equipment. Any slash piles created would be burned during favorable weather conditions.

The proposed action is expected to begin in 2013 and be implemented over the next 10 years. Tree planting would not occur until other operations have been substantially completed in an area.

1.8 Decision to be Made

This document discloses the environmental consequences of implementing the proposed action and alternatives; this Final Environmental Impact Statement (FEIS) was prepared after receiving public comments on the draft EIS.

Given the purpose and need and the environmental effects described in the analysis, the Divide District Ranger will review the proposed action and other alternatives, to make the following decisions:

- Will project activities be implemented as proposed, as modified, or not at all?
- If project activities proceed, which design features or monitoring items will be incorporated?

A separate Record of Decision (ROD), signed by the Responsible Official, will explain the rationale for the decision and disclose how the decision responds to the relevant issues and moves toward Desired Conditions described in the Forest Plan.

1.9 Public Review and Comment

Public involvement was key in the project planning process. The Forest invited public comment and participation through a variety of methods throughout the planning process:

- News releases regarding the DEIS availability and project were published in the *Valley Courier* and *Grand Junction Sentinel*.
- A Legal Notice regarding the opportunity to comment was published in the *Valley Courier*, newspaper of record, on April 27, 2012.
- The public notice and comment letter for the DEIS (or the actual document) was mailed to a total of 190 individuals, organizations, government agencies, Tribal contacts, and elected officials on April 24, 2012.
- Notice of Availability of the Draft EIS was published in the Federal Register on April 18, 2012.
- The Notice of Intent (NOI) was published in the *Federal Register* on April 11, 2011. The NOI asked for public comment on the proposed project prior to May 20, 2011.
- Listed the project in the Forest Schedule of Proposed Actions in March 2011
- Mailed a scoping letter describing proposed activities on April11, 2011 to 211 individuals, organizations, government agencies, and Tribal contacts;
- Published a public notice was in the *Valley Courier*, newspaper of record, on April 16, 2011.

Eleven letters or other communications were received in response to initial scoping. A comment analysis process was used to identify and sort individual comments. Five letters were fully supportive of the project and six contained an issue(s) or concern(s) that needed to be addressed by the Interdisciplinary Team (IDT).

Each concern identified during scoping was considered as a potential issue. Following the comment analysis process, similar individual comments were consolidated into issue statements from which the IDT developed a list of issues to address in this analysis.

1.10 Issues

As described in Forest Service Handbook (FSH) 1909.10, issues are: a) cause and effect statements that serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives; b) used to identify opportunities during the analysis to reduce adverse effects; and c) used to compare trade-offs in an understandable and, if possible, quantitative manner. The process is intended to ensure that all key issues are identified and that all relevant issues are appropriately addressed in the analysis.

Issue statements were evaluated by the IDT and then classified into Key and Non-key issues. Non-key issues were those concerns that the IDT felt would be addressed: as part of the analysis, by Forest Plan Standards and Guidelines (S&G), Best Management Practices (BMPs), Project Design Criteria, mitigation measures, and/or monitoring. The issue analysis process is documented and is part of the project record.

The Forest Service identified two key issues for the Black Mesa Project. The key issue statements and selected measurement indicators were identified or developed by the IDT in response to scoping comments and used to: develop an additional action alternative, to focus the analysis, use as discussion points, and to compare potential effects of each alternative for this project.

Key Issue 1 - *Spruce beetle populations have exceeded endemic levels and may have moved forest stands away from Forest Plan Desired Conditions of protecting and promoting forest products, while perpetuating landscape diversity.*

Indicators:

- Acres, distribution, and species composition of stands regenerated to desired stocking levels within 5 years after harvest;
- Tons per acre of large diameter fuel removed and effect on potential fire severity;
- Acres salvaged;
- Volume of commercial forest products recovered.

Key Issue 2 – *Project activities may fragment and reduce habitat quality for a variety of wildlife including Management Indicator Species (MIS), Threatened, Endangered, Sensitive, or Proposed species (TESP), big game, migratory birds, and other native species*.

Indicators:

- Acres of Dense Horizontal Cover impacted in the short term;
- Changes in acres of temporary unsuitable lynx habitat in the Tres Mesa and Thirty Mile Lynx Analysis Units;
- Acres treated that contribute to the exemptions and exceptions within the Southern Rockies Lynx Amendment;

- Miles of old non-system roads re-opened;
- Miles of new temporary road construction

1.12 Opportunities

As part of the scoping and analysis process, several opportunities were identified:

- Road-stream crossing repair and rehabilitation (see chapter 3, Watershed)
- Regeneration of beetle-infested stands to a mix of spruce, fir, and aspen across the landscape.
- Firewood cutting
- Decommission roads no longer needed.

Some or all of these opportunities are incorporated into the proposed actions and may be funded entirely or partly by funds generated through the action alternatives (Knutson-Vandenberg Act) or other sources.

1.13 Changes made from Draft EIS to Final EIS

The Notice of Availability (NOA) was published in the Federal Register on April 18, 2012. The public notice and comment letter for the DEIS (or the actual document) was mailed to a total of 190 individuals, organizations, government agencies, Tribal contacts, and elected officials on April 24, 2012.

Thirteen comment letters were received from the individuals, organizations, or agencies listed in table 1-3 in response to the DEIS.

Table 1-3. List of those that commented on the DEIS.

Commenter	Date	Representing
Robert Siddons	05/14/2012	Robert Siddons
Jim Moore	04/27/2012	Hermit Lakes Recreation, Inc.
Wayne and Virginia Humphrey	05/05/2012	Wayne and Virginia Humphrey
Patricia and Daniel Moore	04/27/2012	Patricia and Daniel Moore
James Moore	04/27/2012	James Moore
Bob Prentice	05/20/2012	Bob Prentice
Verna Schmittel	04/26/2012	Verna Schmittel
Randy Riggs	04/27/2012	Randy Riggs
Robert Stewart	06/04/2012	US Department of Interior
Suzanne J. Bohan	06/05/2012	US Environmental Protection Agency, Region 8
Joanie Berde	04/27/2012	Carson Forest Watch
Ray and Jane Humphrey	05/02/2012	Ray and Jane Humphrey
Rocky Smith, Veronica Egan, Christine Canaly	06/08/2012	Rocky Mountain Wild, Great Old Broads for Wilderness, San Luis Valley Ecosystem Council

As a result of these comments on and additional review of the DEIS, the Forest Service has incorporated the following changes to the Final EIS (FEIS):

- Minor corrections of typographical errors, other clarifications, and updates were made throughout the FEIS.
- Lynx LAU baseline tables 3-6 and 3-7 and “Exemption and Exception” summaries were updated to move acres of lynx habitat expected to be impacted within one mile of private land by activities proposed under Alternatives 2 and 3 into the WUI exemption provided for under the SRLA.

- Table 2-3 was updated to correct a calculation error in values for acres of temporary unsuitable lynx habitat.
- The three-toed woodpecker was removed from the R2 list of Sensitive species.
- Tables 2-1 and 3-37 were updated to correct acres of WUI fuel treatment proposed in the Inventoried Roadless Areas; there are no proposed WUI fuels treatments in the Pole Mountain/Finger Mesa IRA, all of the proposed treatments are in the Box/Road Canyon IRAs.
- The water quality data collected as part of the stream surveys were included in Appendix D.
- Map B-4 in Appendix B was updated to add the locations of springs, wells, wetlands, and streams.
- Section 3.13, Air Quality, was expanded to display visibility trends in the Weminuche Wilderness Area and to discuss criterion pollutants and other potential effects on air quality resulting from proposed activities.
- Table 3-32 was modified to clarify the projected tons per acre of down woody debris that would be removed by harvest activities versus what would be left on-site.
- Chapter 4 was updated to include the list the individuals, organizations, and agencies that received notification of the notice and comment period for the DEIS and a list of those that received notification of the availability of FEIS.
- Appendix E was added to include the public comment letters and Forest Service response to comments on the DEIS.

CHAPTER 2 - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes and compares the alternatives developed to meet the purpose and need for the Black Mesa Vegetation Management Project (Black Mesa Project). The proposed action and alternatives, including the No Action alternative, are described and compared. This chapter also provides a summary of the environmental consequences of the alternatives, as measured in chapter 3.

2.2 Alternatives Considered in Detail

Considering the purpose and need, site-specific resource information, Forest Plan desired conditions and objectives; and public scoping comments and issues, the Forest Service developed three alternatives, including No Action and the Proposed Action, for this project.

The Council for Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) requires that a No Action alternative be developed as a benchmark from which the agency can evaluate the proposed action.

Each action alternative was designed to address an identified key Issue. Alternative 2 (Proposed Action) addresses key Issue 1 and Alternative 3 (Limited Action) addresses key Issue 2. Alternative(s) considered, but dropped from detailed study are presented below. Collectively, these alternatives represent a reasonable range of alternatives given the site-specific situation, purpose and need, and Issues for this project. Table 2-4 provides a comparison of the alternatives considered and analyzed in detail, organized by resource.

Alternative 1 – No Action

Figure 2-1, shows the areas mapped by aerial detection surveys in the analysis area with some level of spruce beetle mortality as of the summer of 2011. To date, over 18,000 acres of spruce have been affected to various extents in the area. The Forest FSVeg database has over 21,000 acres mapped as spruce/fir stands in the analysis area; Engelmann spruce is also a component of the stands mapped as aspen and mixed conifer. It is expected that dead Engelmann spruce will dominate the landscape on many of these acres within the next 5 years.

Under No Action, natural processes would continue. No salvage of dead or dying trees would occur beyond those areas open to permitted firewood cutting. Seedlings would not be planted to reforest under-stocked stands or to improve species composition. Over time, tons per acre of large diameter down fuel would continue to increase as trees die and fall. Hazard tree removal would be done as part of maintenance activities by road crews, recreation facility managers, homeowners, or livestock permittees on an ongoing basis. Wildland- Urban Interface (WUI) fuels reduction treatments adjacent to private land would not occur. System roads would be maintained as funding permits. Other activities, such as livestock grazing and dispersed recreation would continue.

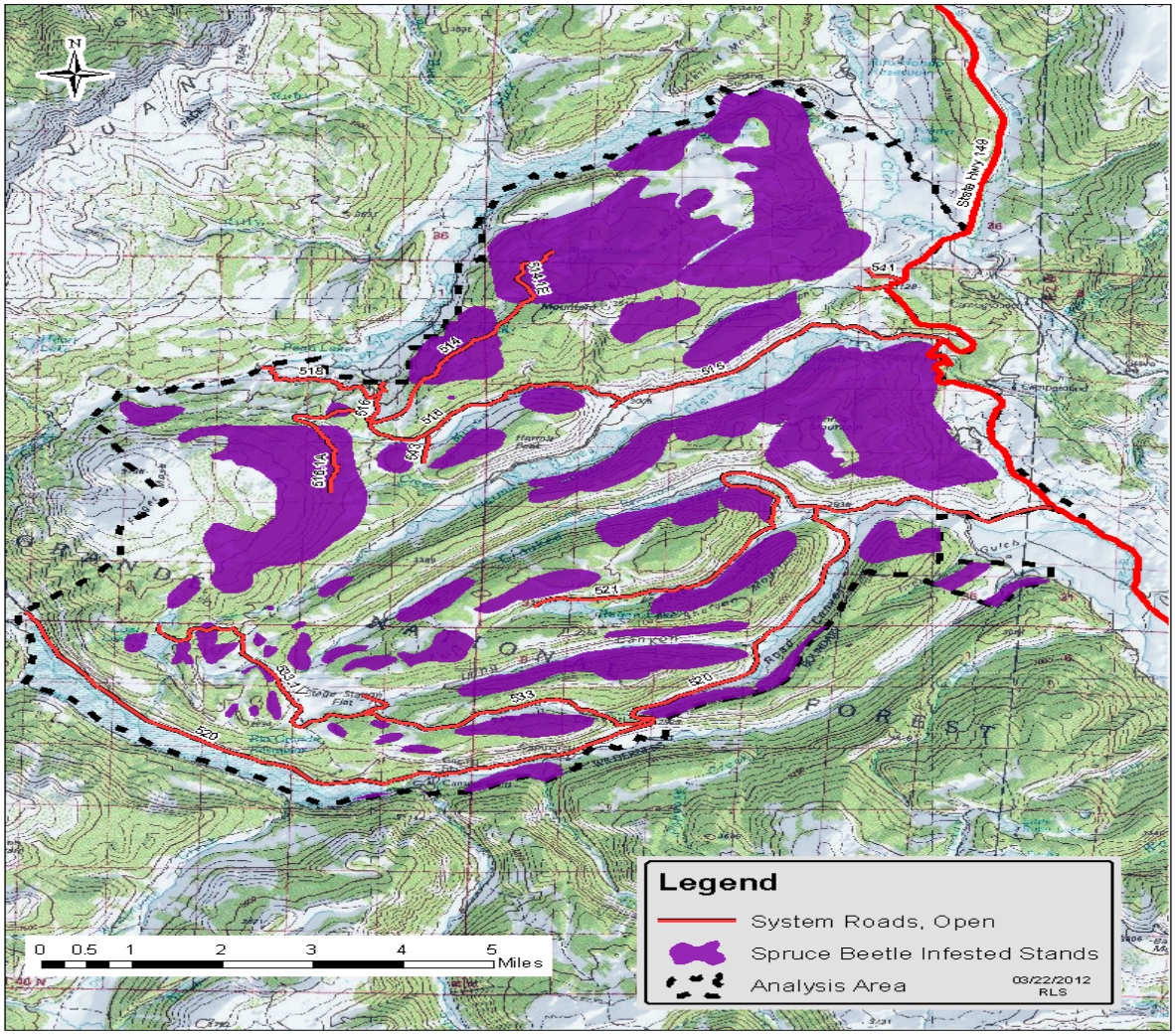


Figure 2-1. Cumulative spruce beetle infested stands, Black Mesa analysis area.

Alternative 2 – Proposed Action (*Preferred Alternative*)

Proposed treatment areas and road system needed under this alternative are shown in figure 2-2. A larger scale map with unit numbers is located in appendix B.

Under this alternative, salvage harvest would be implemented to recover wood product value from dead and dying spruce. Trees would be harvested only on slopes less than 40 percent and suitable for ground-based logging equipment. Merchantable trees 8 inches diameter breast height (dbh) and larger would be considered for harvest. All or part of cut trees would be skid to designated landings. Tons per acre of expected large diameter fuels would be decreased on treated acres. Salvage harvest would occur on up to 9,410 acres, producing approximately 50 to 60 million board feet (MMBF) (100,000 to 120,000 hundreds cubic feet (CCF)) of wood products. Commercial salvage harvest would occur only on MAP 5.13 and 4.21, both of which are included in the suitable timber base. It is estimated that about 94 acres of landings would be needed across the project area. Landings from previous harvests would be re-used as much as possible.

This alternative would require the following road system:

- Maintenance and use of about 26.8 miles of NFS (National Forest System) roads open to public travel.
- Construction to relocate of up to 2.0 miles of FSR 543 to improve road grade.
- Construction of about 3.6 miles of new temporary road segments.
- Maintenance and use of about 5.4 miles of old, non-system roads from previous harvests.
- Maintenance and use of about 39.5 miles of NFS gated roads, closed to public motorized travel.

As required, following the completion of project activities, all new temporary road segments and old, non-system roads would be closed and decommissioned. The NFS roads open or closed to public motorized travel would not change. All landings would be rehabilitated following use.

Following harvest activities, treated areas would be surveyed to evaluate the health, species composition, and distribution of residual trees. Areas not meeting desired forest stocking, composition, or distribution levels would be hand planted with Engelmann spruce seedlings. Exact planting acres would be determined with stocking surveys following harvest completion; it is estimated that about 1,740 acres would be planted. Aspen is a common species in some stands proposed for harvest and an increase in aspen sprouting is expected. Following harvest, stands with a substantial aspen component would be evaluated to determine the desirability of planting Engelmann spruce seedlings versus allowing aspen to dominate over a longer time period in some stands or parts of stands (estimated at 2,415 acres). If aspen regeneration were insufficient, these acres would also be artificially planted.

Hazard tree removal would be implemented within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins, utility lines, or other infrastructure. Hazard distance would depend on localized factors such as slope, topography, and/or the number and arrangement of potentially hazardous trees, along with the desire to avoid leaving linear corridors along infrastructure. Where feasible, these trees would be cut and removed as part of timber harvest activities or removed as firewood by adjacent landowners; otherwise they would be felled, bucked, and left in place. Cutting of hazard trees could occur on any of the MAP lands, as needed to maintain public safety and protect infrastructure.

To improve defensible space, fuel reduction treatments would be implemented in Wildland-Urban Interface (WUI) areas up to 400 feet from adjacent private land or other structures on approximately 436 acres. These treatments would focus on thinning understory trees (<8” dbh) and shrubs, as needed, to modify potential fire behavior. Treatments could consist of cutting vegetation with chainsaws and handpiling slash or grinding it with mechanized equipment. Any slash piles created would be burned during favorable weather conditions.

Fuel reduction treatments are proposed on the Forest Plan MAPs shown in table 2-1. A portion of the acres proposed for WUI fuel treatments are within Rio Grande Inventoried Roadless Areas (IRAs). Only existing authorized roads would be used to implement all fuel treatments. Limited fuel treatments are consistent with current direction for Forest Plan direct for IRAs.

Table 2-1. WUI fuel treatment acres by Forest Plan MAP.

Forest Plan MAP	WUI Fuel Treatment Acres	Acres IRA Name/Number[1]
3.3 - Backcountry	43	43 acres – Box/Road Canyon IRA / 020964
3.4 – Designated & Eligible Scenic Rivers	53	51 acres –Box Road Canyon Other / 020964
4.3 – Developed & Dispersed Recreation	5	4 acres –Box Road Canyon Other / 020964
5.13 – Forest Products	335	N/A
TOTAL	**436**	**98**

[1]Some of these acres are also included under the Colorado Roadless Area proposal (*Rulemaking for Colorado Roadless Areas Revised Draft EIS (February 2011*)

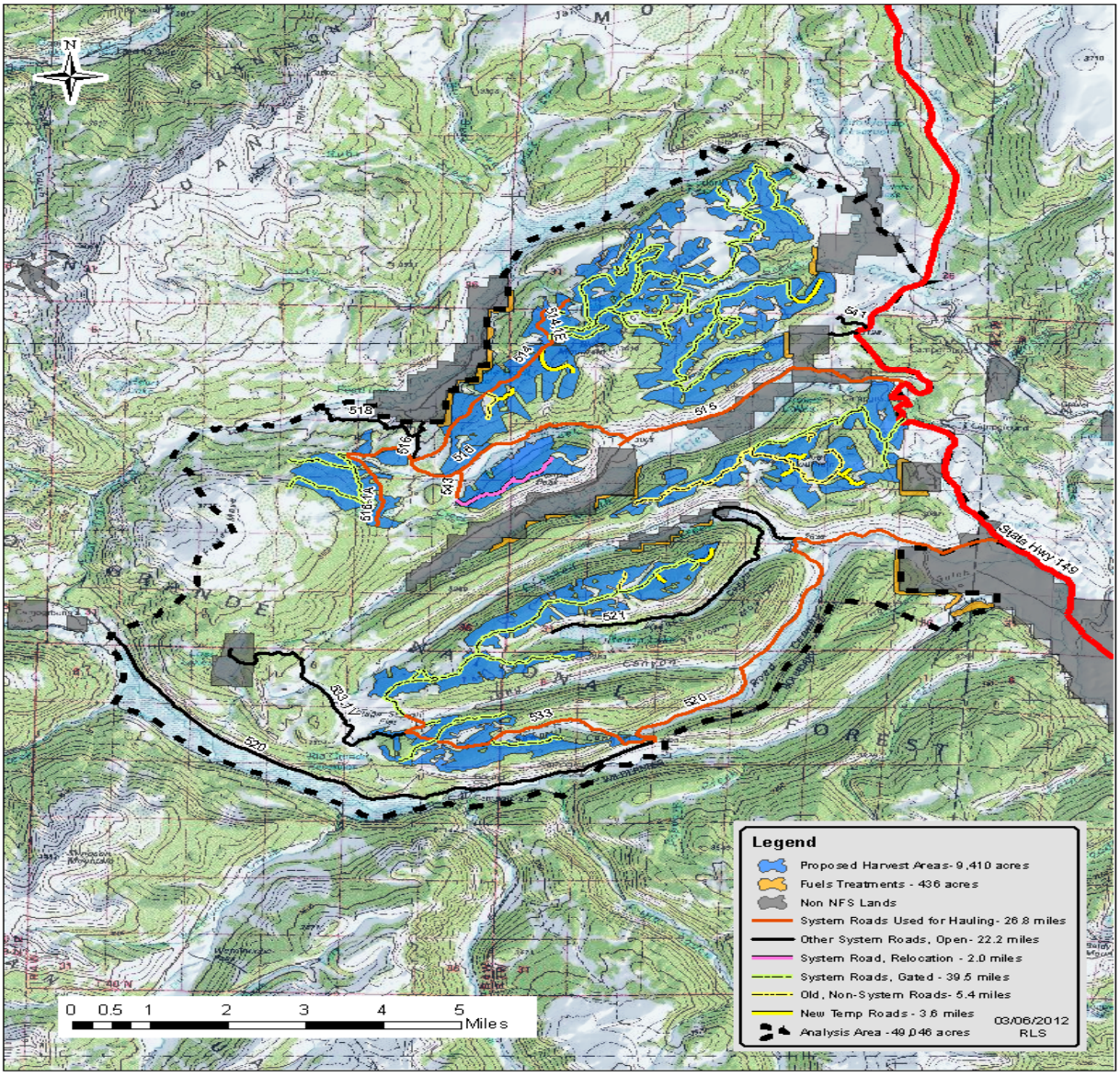


Figure 2-2 Proposed harvest areas and road system, Alternative 2.

Alternative 3 – Limited Action

Proposed treatment areas and road system needed under this alternative are shown in figure 2-3. A larger scale map with unit numbers is located in appendix B.

All activities described under the Proposed Action would occur under this Alternative, except fewer acres would be harvested and fewer acres would be regenerated. Tons per acre of expected large diameter fuels would be decreased, but on fewer treated acres. Since fewer acres would be harvested, fewer acres would be needed for landings and fewer miles of system and non-system roads would be required. Salvage harvest would occur on up to 6,587 acres, producing approximately 35 to 45 MMBF (70,000 to 90,000 CCF) of wood products. Commercial salvage harvest would occur only on MAP 5.13 and 4.21, which are both included in the suitable timber base. It is estimated that about 65 acres of landings would be needed. Landings from previous harvests would be re-used as much as possible.

This alternative would require the following road system:

- Maintenance and use of 25.4 miles of NFS roads currently open to public travel.
- Construction of about 0.9 miles of new temporary road segments.
- Maintenance and use of about 4.4 miles of old, non-system roads from previous harvests.
- Maintenance and use of 20.1 miles of NFS gated roads closed to public travel.

Following the completion of project activities, all new temporary road segments and old, non-system roads would be closed and rehabilitated. The NFS roads open or closed to public travel would not change. All landings would be rehabilitated following use.

Road Decommissioning - Following completion of project activities, approximately 11.8 miles of gated NFS road segments would be decommissioned by removing culverts, installing waterbars, and seeding as needed to stabilize the road surface. Additionally, creating berms, felling trees or similar actions could be used to close these road segments to any motorized use. These road segments are currently closed to public travel and are not expected to be needed for ongoing or future management activities.

Following harvest activities, harvested areas would be surveyed to evaluate the health, species composition, and distribution of residual trees. Exact planting acres would be determined with stocking surveys following harvest, but it is estimated that about 995 acres would require planting. Stands with a substantial aspen component would be evaluated to determine the desirability of planting Engelmann spruce seedlings versus allowing aspen to dominate over a longer time period in some stands or parts of stands (estimated at 1,902 acres). If aspen regeneration were insufficient, these acres would also be artificially planted.

Hazard tree removal and fuel reduction treatments would be the same as described under Alternative 2.

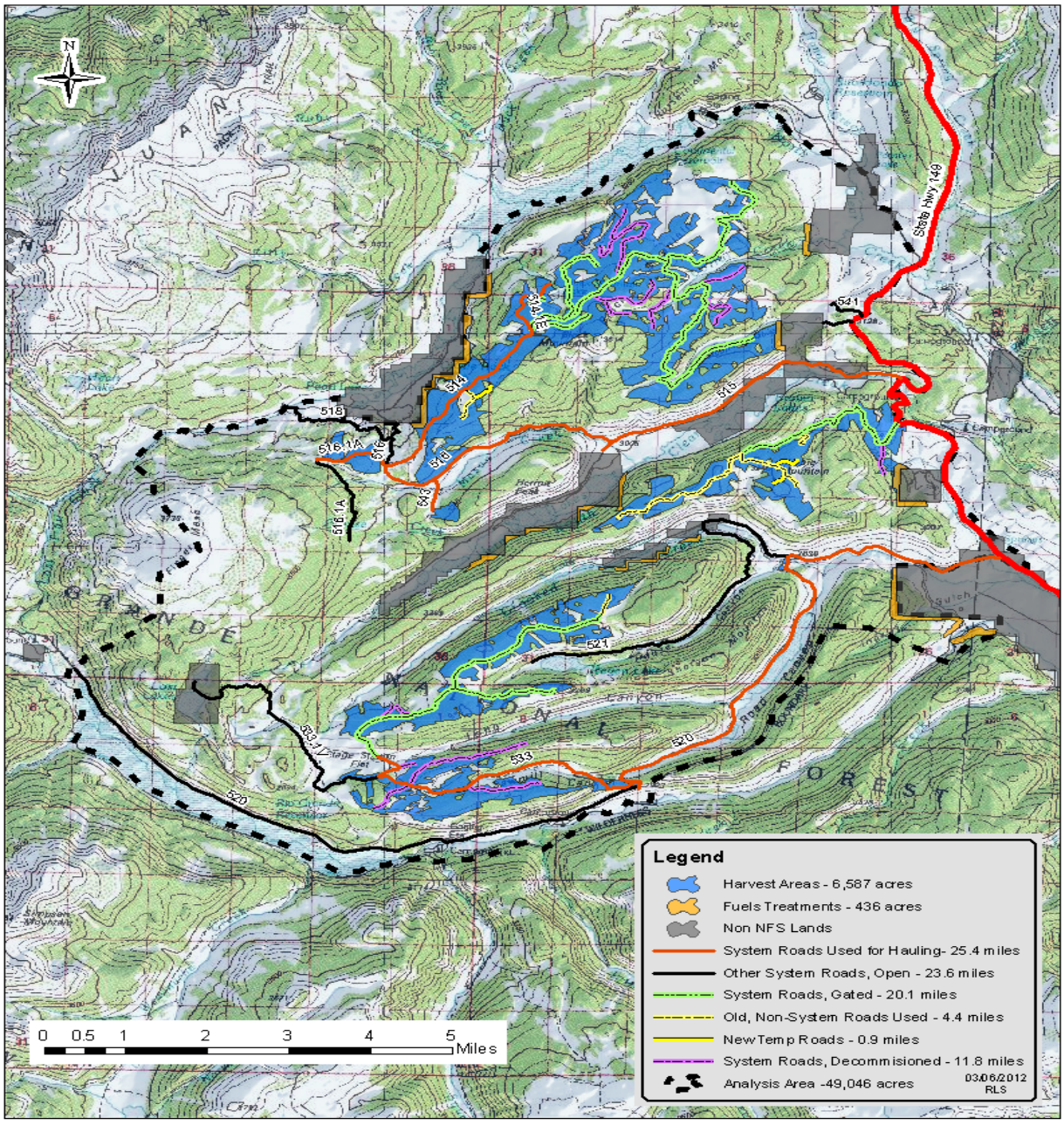


Figure 2-3. Proposed treatment areas and road system, Alternative 3.

2.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. These alternative(s) were considered, but dismissed from detailed consideration for reasons summarized below:

1. **Remove hazard trees only to protect infrastructure** – this alternative would not meet the Purpose and Need for the project for recovering the value of wood products or accelerating the rate of forest recovery to meet the long term desired conditions.

2.4 Design Criteria for Action Alternatives

The Forest Service uses many measures to reduce or prevent negative impacts to the environment in the planning and implementation of management activities. The application of these measures begins at the project planning and design phase. Forest Plan Standards and Guidelines and Best Management Practices (BMPs)as incorporated in the R2 Watershed Conservation Practices Handbook (FSH 2509.25) are the first protection measures to be applied. Both of these sources are incorporated by reference. Other Project Design Criteria (PDC) have been included, as needed.

The PDC listed in table 2-2 have been found to be effective in reducing potential impacts. These criteria have been organized into logical categories. Each PDC statement applies to a specific Action Alternative as indicated by an "x" in the far right column.

Table 2-2. Project Design Criteria for each action alternative.

Action	Alt. 2	Alt. 3
Timing of Operations		
No hauling during weekends from Memorial Day weekend to Labor Day weekend, and no hauling the 3rd through the 5th of July; Friday – Monday of Labor Day Weekend; and Friday starting at noon, Saturday, Sunday of the first big game rifle hunting seasons.	X	X
No hauling will occur along FSR 520 prior to 7 am or after 7 pm from Memorial Day through Labor Day, unless otherwise approved by the Forest Service.	X	X
Winter logging is encouraged to reduce ground disturbance and impact to potentially undocumented heritage resources.	X	X
Winter logging is encouraged to limit direct disturbance to the fewest number of wildlife species as possible but will cease by May 1 at which time lynx kittens are being born.	X	X
Harvest activities will generally not occur between May 1 to July 1 to minimize disturbance to lynx kittens and during elk calving and deer fawning periods, unless otherwise approved by the District Ranger and District Biologist.	X	X
Wildlife/TES/MIS		
The project has been surveyed for TES and MIS species. Surveys will continue during project implementation. If a species is discovered, they will be protected as indicated in the Forest Plan with consultation with the U.S. Fish and Wildlife Service, as necessary.	X	X
Gated roads utilized during logging activities and following logging will remain closed to the general public to minimize wildlife disturbance (and for public safety). An exception may be temporarily opening roads for public firewood collection following harvest.	X	X
Noxious Weed Management		
All organic material used for rehabilitation: seed, straw, erosion control material, or other, will be certified weed free.	X	X
The timber purchaser or other contractors will be required to clean all logging and construction equipment that operates off roads prior to entry to the project area.	X	X
Haul routes and highly disturbed areas, such as landings, will be treated for noxious weed infestations as needed for five years following harvest.	X	X
Road fill and road base material brought in off site will come from a borrow source free of State Listed Noxious Weeds. The Forest Service will inspect and approve the borrow source location prior to materials being hauled to the project area.	X	X

Table 2-2. Project Design Criteria for each action alternative.

Action	Alt. 2	Alt. 3
Livestock Management		
As needed in individual Sale Areas, temporary fences would be constructed to restrict livestock access to the project areas during harvest and the early stages of planting and regeneration of the harvest area. Where possible, any new fences would utilize existing barriers and openings or openings created by harvest activities to reduce the need to clear brush or trees. When the temporary fence is no longer needed, it would be removed.	X	X
If current natural barriers are made ineffective with the development of skid trails or tree removal, new fence locations would be identified on a sale area basis. Fences would be constructed as necessary to ensure allotment rotations are in compliance with individual Allotment Management Plans and Annual Operating Instructions.	X	X
Protect Improvements		
Identify, avoid, and protect overhead and underground utility lines during road improvement, maintenance, and closure work, as well as during material haul and equipment transport.	X	X
Any protected improvements such as fences and water developments, identified on sale area maps or in fuel treatment areas, will be protected during harvest or treatment activities. Damaged improvements will be repaired or replaced, depending upon the amount of damage.	X	X
Hazard Trees		
Hand felling of hazard trees is permitted in the WIZ. Trees shall be directionally felled and may be left in place to maintain or improve stream and riparian health. If necessary, felled trees may be stabilized to prevent movement. The Forest timber sale or contract administrator shall consult the Forest hydrologist or wildlife/fish biologist prior to granting approval to remove hazard trees from WIZ areas.	X	X
Any hazard tree, and associated slash, cut and lying within 100 feet upstream of a perennial or intermittent culvert/bridge crossing and within 25 feet from the stream edge that has the potential to obstruct the crossing shall be stabilized, removed, or moved at least 50 feet upslope away from the stream.	X	X
Felled hazard trees and slash shall be removed from roadside ditches and culverts, including removing from cross drains and sediment traps.	X	X
Felled hazard trees may be removed from stream corridors or riparian areas with Forest Service approval when they create unacceptable fuel loading; fail to meet visual objectives; or create unacceptable limits to human, livestock, or wildlife movement.	X	X
Hazard trees shall not be skidded across perennial or intermittent stream channels.	X	X
If hazard trees need to be removed from WIZ areas, use at least one-end suspension and felled in a way that protects vegetation from damage.	X	X
Avoid creating open linear corridors when removing hazard trees along roads, powerlines or other linear infrastructure; vary corridor width considering natural vegetation patterns and topography to blend treatments into local landscape.	X	X
To the extent practicable, hazard trees cut to remain on site within the visible immediate foreground (0-300 feet) of FSRs 515, 516, 520 or Highway 149, will be arranged at random as found in nature to maintain high scenic integrity.	X	X
Soil and Water Protection		
If whole tree yarding is used, limbs and/or tops shall be returned to the unit if 15% or more of the unit has exposed mineral soil; this material shall be distributed in areas primarily comprised of bare mineral soils.	X	X
Operate heavy equipment for land treatments only when soils are dry, soil moisture is below the plastic limit, or protected by at least 1 foot of packed snow or 2 inches of frozen soil.	X	X
Re-use existing skid trails and landings whenever practical.	X	X

Table 2-2. Project Design Criteria for each action alternative.

Action	Alt. 2	Alt. 3
Skid trail locations will be agreed to by the Forest Service in advance of construction; spacing will be approximately 100 feet apart, allowing for topographic variation and skid trail convergence; skid trails will be waterbarred at least every 100 feet on gradients greater than 20 percent, otherwise where needed depending on slope and ground conditions as per BMPs; slash will be placed on main skid trails as needed to control erosion.	X	X
Skidding equipment will generally be restricted to slopes <35%.	X	X
During project implementation, temporary roads will be outsloped, covered with slash (when needed), and blocked to vehicle access after the harvest season and before onset of the wet season.	X	X
Units with an existing detrimental soil disturbance level ≥12% will be treated as necessary to ensure post-treatment forest plan compliance, as determined by Forest Soil Scientist. **Detrimental disturbance levels will be brought within the 15% standard through post-harvest subsoiling/ripping of primary skid trails, landings, and/or temporary roads to a depth of 12-24 inches and seeded or covered with slash after harvest (and before unit acceptance), as needed. If harvested, these treatments will occur on units 1, 2, 3, 4, 7, 8, 17, 18, 22, 24, 25. It will also include any other units which are determined to exceed 15% detrimental disturbance after harvest.**	X	X
Temporary stream crossing structures (i.e. culverts, bridges, etc.) will be designed to provide for passage of flows and sediment, withstand expected flood flows, and allow free movement of resident aquatic life. Upon project completion, remove all temporary crossings, restore the channel morphology, and revegetate channel banks.	X	X
Slash piles shall be located at least 50 feet (hand piles) or 200 feet (machine piles) from perennial streams, lakes, ponds, wetlands, or riparian areas.	X	X
A no harvest buffer has been established along all intermittent and perennial stream channels for 100 feet on both sides of the channel. No heavy equipment will operate within this buffer except at designated crossings, unless authorized by the Forest Service where site-specific conditions would minimize stream and riparian impacts.	X	X
A no-harvest buffer of 50 foot would be implemented on ephemeral channels to ensure watersheds protection from sediment generated from harvested areas.	X	X
Hydrology, soils specialists, or their designees will inspect harvest units for seepages or riparian areas. Where found, these features will be protected through sale marking and layout; a 100 ft. no-harvest or skidding buffer will be maintained from the edge of all wetlands.	X	X
All roads (existing, new temporary, or old non-system) used for project will be evaluated to identify and correct erosion or sediment problems. Additional cross drains or other standard measures will be used as appropriate to divert any road drainage into buffer strips and minimize road drainage into steam channels.	X	X
Existing vegetation on cut and fill slopes would be retained as much as possible to limit sediment movement away from road.	X	X
Where existing roads will be reconstructed within 100 feet of intermittent or perennial streams, hydrology, soil specialists or their designees will be consulted to ensure sediment sources are disconnected from stream channels. If necessary, hardening, filter fence, straw wattles, timber slash windrows, or other measures will be used as appropriate to prevent sediment from entering a stream course.	X	X
Following timber and reforestation operations, all temporary roads used for this project will be closed and obliterated.	X	X
Scenic Resources		
No single spaced trees will be left along ridgelines or openings.	X	X
Locate openings of units seen from FSRs 515, 516, 520 and Highway 149 (units 6, 7, 12) adjacent/joining natural openings, so that treated areas look like natural extensions of	X	X

Table 2-2. Project Design Criteria for each action alternative.		
Action	**Alt. 2**	**Alt. 3**
meadows.		
Visible stumps within the immediate foreground (0-300 feet) of FSRs 515, 516, 520 and Highway 149 (units 6, 7, 12) should be cut as close to the ground as practicable, a maximum stump height of 6 inches is recommended.	X	X
Seen portions of Unit 6 and Unit12 would have form and shape that simulates natural patterns (i.e., avoiding straight lines and sharp corners). Edges would be tied into existing meadows and openings where possible; feather edges to allows gradual transition into the untreated adjacent forest area (as opposed to a harsh line); Include Landscape Architect in final layout for these units.	X	X
Patterns from fuels treatments will resemble characteristic landscape patterns for aspen with irregular edges.	X	X
Vegetation Protection/Biodiversity/Regeneration		
In all salvage stands that exceed 50 percent removal of overstory spruce, reforestation surveys will be conducted, and if the survey indicates that Forest Plan stocking Standards will not be met, these stands will be artificially reforested to meet or exceed Forest Plan Standards.	X	X
To protect soil, leave trees, and advanced regeneration, tractor skid trails will be located and approved in advance of falling and logs will be skidded with the leading end free of the ground to reduce ground disturbance.	X	X
Retain a minimum of 6 snags/acre in various stages of decay and distribution. Select snags with a larger-than-average diameter for the stand, where available.	X	X
Trees with known active bird nests/cavities will be designated for retention.	X	X
Retain all live/uninfested trees in salvage units, except for trees that need to be removed for operational/safety purposes.	X	X
Effects to understory vegetation and dense horizontal cover will be minimized to benefit snowshoe hare and lynx by identifying skid trail locations away from dense understory and spacing skid trails at least 100 feet apart, allowing for topographic variation and skid trail convergence.	X	X
Place landings in open areas if available, to protect understory.	X	X
Retain patches of overstory trees with dense understory.	X	X
Leave sufficient trees or retain existing large woody debris (a minimum of 10-15 tons per acre in spruce fir) on harvested sites to retain moisture, trap soil movement, provide microsites for establishment of forbs, grasses, shrubs and trees, and to provide habitat for wildlife.	X	X
If chipping/grinding or other mastication method is used to treat understory fuels, slash shall not cover more than 50% of ground surface and depth shall not exceed 4 inches to minimize impacts to understory vegetation.	X	X
Seeding of disturbed sites would utilize a native subalpine grass mix and application prescriptions	X	X
Public Safety/Air Quality		
Roads used for vegetation treatment and log hauling would be maintained in accordance with the contract requirements, including dust abatement during dry seasons. Temporary traffic control in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) would be utilized for roads open to public motor vehicle use.	X	X
Notify the public of logging and/or burning activities through media such as local newspapers, radio, and the Forest website.	X	X
Caution signs notifying public of logging activities will be prominently displayed at start of all open roads and all junctions.	X	X
All gated roads will remain closed during harvest activities.	X	X
If log hauling occurs during the summer, dust abatement will be required on the haul route portion of FSR 520 adjacent to recreation sites and private homes.	X	X

Table 2-2. Project Design Criteria for each action alternative.		
Action	**Alt. 2**	**Alt. 3**
Any system roads utilized for winter logging activities will provide for two way traffic, either through width of plowing or frequent pull-outs.	X	X
Sale Administration Personnel will emphasize road safety and the need for reduced speeds to Logging Operators due to the high level of motorized recreation activities, especially on FSR 520.	X	X
Prior to pile burning, a burn permit will be obtained from the State of Colorado to ensure operations meet air quality standards and smoke impacts are minimized.	X	X
Heritage		
Site 5HN1300.1 is the unevaluated site representing an historic telephone line. All remnants of this line will be avoided within Unit 16 until further research and documentation can occur. The following eligible and unevaluated sites will also be avoided: 5HN9, 5HN10, 5HN11, 5HN53, 5HN56, 5HN57, 5HN58, 5HN59, 5HN60, 5HN61, 5HN62, 5HN63, 5HN70, 5HN76, 5HN222, 5HN1203, 5HN1204, 5HN1205, 5HN1294 and 5HN1300.1. Location data will be provided to the timber program so that they can easily avoid these sites	X	X
The Discovery and Education stipulation below will be emphasized in areas with large aspen with regard to avoidance and protection of potential undocumented arborglyphs, especially in the area of Stage Station Flats.	X	X
Any new road construction or improvements not previously analyzed within this environmental analysis will require a review and potential inventory by Forest Service archaeologists.	X	X
All persons associated with operations under this authorization must be informed that any objects or sites of cultural, paleontological, or scientific value such as historic or prehistoric resources, graves or grave markers, human remains, ruins, cabins, rock art, fossils, or artifacts shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are encountered, the proponent shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the Rio Grande National Forest authorized officer of the findings. The discovery must be protected until notified in writing to proceed by the authorized officer (36 CFR 800.110 & 112, 43 CFR 10.4).	X	X

2.5 Comparison of Alternatives

The following section provides summaries of the effects of implementing each alternative. A comparison of how each alternative addresses the key issues, identified in chapter 1, is shown in table 2-3. Table 2-4 shows a summary comparison of alternatives and their effects on other resources.

Table 2.3. Comparison of Alternatives by Key Issue statement.				
		ALTERNATIVES		
Key Issue #	**Indicator(s)**	**1 No Action**	**2 Proposed Action**	**3 Limited Action**
#1-*Spruce beetle populations have exceeded endemic levels and may have moved forest stands*	Acres, distribution, and species composition of stands regenerated to desired stocking levels within 5 years after harvest	N/A	9,410	6,587

Table 2.3. Comparison of Alternatives by Key Issue statement.

Key Issue #	Indicator(s)	ALTERNATIVES 1 No Action	2 Proposed Action	3 Limited Action
away from Forest Plan Desired Conditions of protecting & promoting forest products, while peretuating landscape diversity	Tons/acre of large diameter fuels removed Potential fire severity	0 High	33 Decreased	33 Decreased
	Acres salvaged	943[a]	9,410	6,587
	Volume of commercial forest products recovered.	0	100,000 to 120,000 CCF 50-60 MMBF	70,000 to 90,000 CCF 35-45 MMBF
#2- Project activities may fragment and reduce habitat quality for a variety of wildlife, including MIS, TESP, big game, migratory birds, and other sensitive species	Acres of Dense Horizontal Cover impacted in the short term	0	-757	-567
	Changes in acres of temporary unsuitable lynx habitat in the Tres Mesa & Thirty Mile LAUs	0	-1,156	-828
	Miles of old, non-system roads re-opened and used	0	5.4	4.4
	Miles of new temporary road constructed	0	3.6	0.9

[a] Firewood cutting of standing dead trees is permitted within 300' of open roads. A value of 150' was used to estimate acres affected, since many areas are not accessible due to topography and not all acres adjacent to open roads are forested.

Table 2-4 provides a comparison summary of effects on resources as described in chapter 3.

Table 2-4. Comparison of Alternatives for resources.

Resource and Unit of Measure	ALTERNATIVES 1 No Action	2 Proposed Action	3 Limited Action
Forested acres NOT treated in analysis area	Spruce/fir- 20,949 Other – 10,877	Spruce/fir -13,581 Other – 9,778	Spruce/fir -16,268 Other – 9,914
Acres Treated	943 acres[a]	9,846 acres	7,023 acres
Salvage	943 acres[1]	9,410 acres	6,587 acres
WUI Fuel Treatments	0 acres	436 acres	436 acres
Pile burning	0 acres	116 acres	87 acres
Volume of commercial wood products recovered	0 CCF 0 MMBF	100,000-120,000 CCF 50-60 MMBF	70,000 to 90,000 CCF 35-45 MMBF
Hazard tree removal – infrastructure protection	As needed, ongoing	1.1 to 2.0 tree heights from infrastructure	1.1 to 2.0 tree heights from infrastructure
Acres Regenerated			
Planted Engelmann spruce	0 acres	1,740 acres	995 acres
Aspen sprouting	Minor	2,415 acres	1,902 acres
Residual seedlings/saplings	All acres	5,255 acres	3,690 acres

Table 2-4. Comparison of Alternatives for resources.

Resource and Unit of Measure	ALTERNATIVES		
	1 No Action	2 Proposed Action	3 Limited Action
Road System			
Open NFS roads used & maintained	0 miles	26.8 miles	25.4 miles
Closed NFS roads maintained	0 miles	39.5 miles	20.1 miles
Open NFS Road relocated	0 miles	2.0 miles	0 miles
Closed NFS roads decommissioned	0 miles	0 miles	11.8 miles
New temporary road constructed	0 miles	3.6 miles/ closed following harvest	0.9 miles/ closed following harvest
Old Non-system roads re-opened	0 miles	5.4 miles/ closed following harvest	4.4 miles/ closed following harvest
--- WATERSHED and AQUATIC RESOURCES ---			
Percent Disturbance by Watershed			
Continental Reservoir-North Clear Creek (130100010201)	5.4%	5.6%	5.5%
North Clear Creek (130100010202)	5.4%	5.7%	5.5%
Rio Grande Reservoir (130100010106)	8%	8%	8%
South Clear Creek (130100010204)	6.3%	7.2%	6.8%
Spring Creek (130100010303)	6.8%	7.0%	7.0%
Texas Creek/Rio Grande (130100010304)	1.2%	1.3%	1.3%
Seventh HUCs of Concern	No Effect	No Effect	No Effect
--- SOIL RESOURCES ---			
Total acres treated	0 acres	9,410 acres	6,587 acres
Acres of Units >12% disturbance requiring subsoiling	0 acres	640 acres	410 acres
---WILDLIFE---			
Threatened and Endangered (4 species ; 3 species No habitat)	Lynx – No Effect	Lynx - May Affect, Not Likely to Adversely Affect.	Lynx - May Affect, Not Likely to Adversely Affect.
Sensitive Wildlife Species (26 species;18 species No habitat)	8 species- No Impact.	8 species -May Impact individuals, but not affect population viability.	8 species -May Impact individuals, but not affect population viability.
Management Indicator Species (9 species; 4 species No habitat)	Birds, elk & deer, trout –No discernible change in population effects at forest level.	Birds, deer & elk- Temporary displacement of individuals during logging activities. All-–No discernible change in population effects at forest level.	Birds, deer & elk- Temporary displacement of individuals during logging activities. Less disturbance than Alt.2 All-–No discernible change in population effects at forest level.
Migratory Birds (5 with potential habitat)	Beneficial for snag dependent species.	May impact individuals, but not likely to result in loss of viability.	May impact individuals, but not likely to result in loss of viability.
General Wildlife	No noticeable change in habitat conditions or	No noticeable change in habitat conditions or population trend.	No noticeable change in habitat conditions or population trend.

Table 2-4. Comparison of Alternatives for resources.

Resource and Unit of Measure	ALTERNATIVES		
	1 No Action	2 Proposed Action	3 Limited Action
	population trend.		
---STREAMS AND AQUATIC HABITAT---			
Potential risk to stream & riparian health	Low	Low	Low
---SCENIC RESOURCES ---			
Scenery Integrity Objective	Moderate & High	Moderate	Moderate & High
--- LATE SUCCESSIONAL FORESTS ---			
Acres of Old Growth affected	0 Acres	0 Acres	0 Acres
--- THREATENED, ENDANGERED AND SENSITIVE PLANT SPECIES ---			
T or E Plant Species	No species	No species	No species
Sensitive Plant Species- 5 species with potential habitat	No Impacts	No Impact to 4 species; 1 species -May Adversely Impact Individuals, but no trend toward loss of viability.	No Impact to 4 species; 1 species -May Adversely Impact Individuals, but no trend toward loss of viability.
--- RANGELAND RESOURCES and NOXIOUS WEEDS ---			
Need for fence construction or impacts to livestock grazing operations	Low	Low	Low
Risk of Noxious Weed establishment / expansion	Low	Low to Moderate	Low to Moderate
--- RECREATION ---			
Recreational Impacts – summer	Some in long-term	Moderate- FSR 520 use	Moderate- FSR 520 use
Recreational Impacts - winter	Some in long-term	None	None
--- ECONOMICS ---			
Net Present Value	-$250,000	-$1,437,717	-$1,093,476
Benefit/Cost Ratio	0	0.40	0.37
--- SOCIAL ---			
Benefits to the San Luis Valley	Negative	Some Benefit	Some Benefit
--- HERITAGE RESOURCES ---			
Risk to Identified & Unidentified Cultural Resources	No risk	Very low risk	Very low risk
--AIR QUALITY--			
Impacts to local air quality	No effect	Minor – short term	Minor – short term
--- MONITORING---			
	Done at the Forest Plan level	Done at the Project & Forest Plan level	Done at the Project &Forest Plan level

[a] Firewood cutting of standing dead trees is permitted within 300' of open roads. A value of 150' was used to estimate acres affected, since many areas are not accessible due to topography and not all acres adjacent to open roads are forested..

2.6 Monitoring Measures

Monitoring is gathering information, observing processes, and examining the results of management activities to provide a basis for evaluation. Monitoring is done at both the project and Forest Plan level. The Black Mesa Project contains project specific monitoring. It also includes Forest Plan monitoring and evaluation items. Monitoring includes implementation monitoring and evaluation to ensure that Standards and Guidelines are being incorporated during the project activities, as well as effectiveness monitoring and evaluation to determine whe ther project objectives are being met. Below are monitoring measures that were recommended for incorporation into this project.

Timber Resources

Objective: In conjunction with other resource specialists, ensure that all resource protection measures in the Decision are included in the timber sale contract and properly implemented.
Method: A detailed review and monitoring process will be utilized to ensure protection measures are incorporated and implemented.

Action: Timber sale contracts will be reviewed and certified by the District Ranger to ensure conformance with the Decision Document prior to advertisement of timber sales, ensuring that required protection measures are included in the timber sale contract.
Action: Implementation monitoring will be conducted through harvest inspections. As a routine part of project implementation, contract administrators monitor harvest and construction activities to ensure that project elements and Forest Plan Standards and Guidelines (S&Gs) are followed as designed.
Action: The Timber Sale Administration team is responsible for administering the contract. If required, the team will initiate action to repair resource damage and suspend operations until problems have been corrected.

Objective: Ensure that the treated stands are reforested to at least Forest Plan standards.
Method: Stocking surveys will be conducted the first, third and fifth year (if necessary) after project implementation to evaluate regeneration distribution, species mix, and trees per acre to ensure that the areas are successfully reforested.

Action: If existing regeneration is inadequate, artificial planting would be implemented.

Wildlife

Objective: Evaluate whether Forest Plan S&Gs and project specific wildlife design criteria are being implemented. To examine if a need exists to modify specific wildlife design criteria for future projects.
Method: Perform site inspections during and/or following the vegetative management activities to determine compliance with project design criteria. Items important to monitor include:

- ✓ Snag numbers, species and size
- ✓ Impacts to understory vegetation
  - o Percentage of damage to Dense Horizontal Cover *
  - o Percentage of damage to developing understory *
  - o Skid trail designation
  - o Landing placement
- ✓ TES species monitoring
- ✓ Timing of project activity
- ✓ Amount of large woody debris

- ✓ Riparian area buffers

* Post-harvest monitoring will be implemented to assess actual incidental damage to the understory. If damage is substantially different (+/- 50 percent of the original acreage estimate) than the 30% being estimated, impacts to lynx habitat will be re-evaluated in an addendum to the Biological Assessment. Post-harvest monitoring will also be useful for evaluating future vegetation management projects.

Action: Take corrective action as needed to meet Forest Plan Standards and Guidelines. Consult with the necessary managers as needed to take corrective measures if necessary.

Soil Resources

Objective: Ensure that Project Design Criteria are being properly implemented and Forest Plan S&Gs are being met in regards to soils.
Method: Soil moisture conditions will be monitored during harvest activities by Forest Service personnel.
Action: Ensure that timber harvesting operations are being suspended when soil conditions are too wet to operate and would result in resource damage.

Method: Use accepted soil monitoring techniques to assess overall cumulative soil impacts after harvest is completed.

Action: Conduct traverses, spot soil sampling, or other soil management handbook methods to assess soil productivity and amount of subsoiling needed on a subgroup of units that are currently above 12 percent detrimental soil disturbance within 1 year of harvest. Complete any rehabilitation measures needed within 5 years of harvest.

Watershed Resources

Objective: Ensure that Project Design Criteria are being properly implemented and that Forest Plan Standards and Guidelines are being met in regards to stream health.
Method: Conduct site inspections along affected streams in the project area during and after vegetation management and road activities to assess changes in stream conditions.
Method: Inspect road segments near and at stream crossings after reconstruction/maintenance operations have been completed. Inspections will occur prior to, during, and following vegetation management activities.

Action: Work with the Timber Sale Administration team to ensure that contract provisions are being implemented. Implement additional mitigation if necessary to minimize sediment or other negative impacts to streams.

Objective: Monitor stream channels within and adjacent to harvest areas in the 7th HUC watersheds of Concern to verify project design criteria effectiveness.
Method: Site inspections along affected streams in the project area during and after vegetation management and road activities to assess changes in stream conditions.

Scenic Resources

Objective: Ensure that Project Design Criteria are being properly implemented and that Forest Plan S&Gs are being met in regards to scenic resources.

Method: If Unit 12, adjacent to Highway 149 is harvested, use visual inspection to monitor recovery rate.

Action: Inspect unit 12 after two years to determine if natural regeneration is sufficient. If not, refer to silviculture requirements for direction regarding artificial re-stocking.

Travel Management

Objective: Survey area roads to determine if logging has removed travel barriers and to determine if illegal off-highway vehicle use is occurring as a result of treatments.

Method: Periodic visual inspection

Action: Install additional signs, barriers, and increase law enforcement efforts, as appropriate.

Noxious Weeds

Objective: Ensure that Project Design Criteria are effective and that no additional noxious weed infestations occur within the project area.

Method: Site inspections during and after project implementation to ensure that design criteria are fully implemented. Perform annual surveys for noxious weeds in disturbed areas for up to 5 growing seasons to ensure new weed populations are not being established and if any existing populations are discovered, they are controlled and do not spread.

Action: Treat identified noxious weeds in a timely manner as part of the forest noxious weed treatment program.

Range Resources

Objective: Ensure that range Project Design Criteria are effective.

Method: Site inspections during and after project implementation to ensure that design criteria are fully implemented.

Action: Perform site inspections during and after the project is complete to ensure livestock are not impacting regeneration within the project area and fences are still functional.

Heritage Resources

Objective: Protect known and undiscovered heritage resources.

Method: Newly constructed temporary roads should be monitored for erosion and potential impacts to undocumented heritage resources.

Action: Appropriate action will be determined and implemented to protect affected heritage resources.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter summarizes the existing conditions for selected environmental and social resources in and around the project area along with the expected effects of implementing each alternative. It also presents the scientific and analytical basis for the comparison of the alternatives presented in chapter 2.

Each resource discussion addresses the following components:

1) Scope of the analysis;
2) Past activities that have affected the existing condition;
3) Existing condition and;
4) Direct, indirect, and cumulative effects.

A list of terms and definitions used in the analysis is located in appendix A.

3.2 General Description of the Analysis Area

The analysis area is located approximately 15 miles west of Creede, CO within Hinsdale and Mineral Counties and covers approximately 49,046 acres. The project area is located west of Highway 149. Primary access roads are Forest Service Road (FSR) 520 used to access the Rio Grande Reservoir area and FSR 515 used to access Browns Lake Wildlife area and Hermit Lakes and Pearl Lake private in-holdings. See the vicinity map, figure 1.1, chapter 1.

Not every resource area conducts their specific analysis using the same analysis area boundary. Some evaluations focus on the specific timber stands units; others might need to use a larger area outside the formal analysis area. The “Scope of the Analysis” describes the appropriate scale of analysis used for each resource.

3.3 Alternatives and their effects on Key Issues

Tables 3-1, 3-2 and 3-3 summarize how each alternative addresses the Key Issues and indicators used for this analysis.

Alternative 1 – No Action

Table 3-1. Alternative 1, effects on key issues.

Key Issue	Indicators	Alternative 1 – No Action
#1-*Spruce beetle populations have exceeded endemic levels and may have moved forest stands away from Forest Plan Desired Conditions of protecting & promoting forest products, while perpetuating landscape diversity*	Acres, distribution, and species composition of stands regenerated to desired stocking levels within 5 years after harvest;	N/A
	Tons/acre of large diameter fuels removed Potential fire severity;	0 High
	Acres salvaged	943[a]
	Volume of commercial forest products recovered.	0
#2- Project activities may fragment and reduce habitat quality for a variety of wildlife, including MIS, TESP, big game, migratory birds, and other sensitive species	Acres of Dense Horizontal Cover impacted in the short term	0
	Changes in acres of temporary unsuitable lynx habitat in the Tres Mesa & Thirty Mile LAUs;	0
	Miles of old, non-system roads re-opened;	0
	Miles of new temporary road construction.	0

[a] Firewood cutting of standing dead trees is permitted within 300' of open roads. A value of 150' was used to estimate acres affected, since many areas are not accessible due to topography and not all acres adjacent to open roads are forested.

Key Issue 1. This alternative would not meet the concern expressed by this issue. Existing forest conditions would persist, which would consist of timber stands with an increasing component of dead trees due to spruce beetle activity. Long-term potential to meet Forest Plan desired conditions and objectives for the analysis area would not be met. Short term potential to produce commercial forest products from lands desigated for that purpose in the Forest Plan would not occur. Reforestation activities to ensure forest stocking and improve the potential to diversify vegetation composition in this landscape would not occur. Dead trees would continue to fall over time, increasing the potential for a high severity wildfire, if a fire started. Commercial timber products other than aspen would not be realized until the next rotation in approximately 150 years.

Key Issue 2. This alternative would best meet this issue, at least in the short-term. No additional disturbance activities would reduce potential impacts to wildlife. The changing habitat conditions would favor some wildlife more than others, but there would be minor impacts to existing understory seedlings and saplings from natural blowdown. No additional roads would be constructed or re-constructed that can increase habitat fragmentation. As dead trees fall over time, some areas may become less usable due to the buildup of down trees.

Alternative 2 – Proposed Action *(Preferred Alternative)*

Table 3-2. Alternative 2, effects on Issues.		
Issue	**Indicators**	**Alternative 2 – Proposed Action**
#1-*Spruce beetle populations have exceeded endemic levels and may have moved forest stands away from Forest Plan Desired Conditions of protecting & promoting forest products, while perpetuating landscape diversity*	Acres, distribution, and species composition of stands regenerated to desired stocking levels within 5 years after harvest;	9,410
	Tons/acre of large diameter fuels removed Potential fire severity	33 Decreased
	Acres salvaged	9,410
	Volume of commercial forest products recovered.	50-60 MMBF 100,000 to 1200,000 CCF
#2- Project activities may fragment and reduce habitat quality for a variety of wildlife, including MIS, TESP, big game, migratory birds, and other sensitive species	Dense Horizontal Cover impacted in the short term	-757 acres
	Changes in acres of temporary unsuitable lynx habitat in the Tres Mesa & Thirty Mile LAUs;	-1,156 acres
	Miles of old, non-system roads re-opened;	5.4 miles
	Miles of new temporary road construction.	3.6 miles

Key Issue 1. This alternative would contribute the most to meeting the concerns expressed by this issue. It proposes to implement salvage harvests to recover the value from dead and dying spruce on up to 9,410 acres from lands designated for this purpose under the Forest Plan. The opportunity to harvest these trees would meet the intent of the desired conditions and objectives of the Forest Plan for providing commercial forest products and supporting local economies. This alternative would also provide the opportunity to facilitate forest stand regeneration and diversity by both artificial and natural regeneration methods on the most acres. Removal of a portion of the dead and dying trees on the salvaged acres would also preempt the eventual buildup of large amounts of down wood fuels that could contribute to a high severity wildfire, if a fire started, in an area with relatively high levels of infrastructure and development.

Key Issue 2. This alternative would have the most potential impacts to the varieties of wildlife evaluated, since it proposes the most acres of disturbance by harvest activities. This alternative would have the most impacts to acres of Dense Horizontal Cover (DHC) important to lynx and other wildlife. This alternative would also change the most acres into a temporarily unsuitable condition for lynx habitat. The miles of road needed to implement salvage on these acres would have the most potential to fragment blocks of habitat that are not currently affected by roads. Project design criteria would limit the timing and extent of adverse effects, but loss of DHC and temporary disturbance to other wildlife is expected over a larger area.

Alternative 3 – Limited Action

Table 3-3. Alternative 3, effects on Issues.

Key Issue	Indicators	Alternative 3 – Limited Action
#1-*Spruce beetle populations have exceeded endemic levels and may have moved forest stands away from Forest Plan Desired Conditions of protecting & promoting forest products, while perpetuating landscape diversity*	Acres, distribution, and species composition of stands regenerated to desired stocking levels within 5 years after harvest;	6,587 acres
	Tons/acre of large diameter fuels removed Potential fire severity;	33 Decreased
	Acres salvaged	6,587 acres
	Volume of commercial forest products recovered.	35-45 MMBF 70,000 –90,000 CCF
#2- Project activities may fragment and reduce habitat quality for a variety of wildlife, including MIS, TESP, big game, migratory birds, and other sensitive species	Dense Horizontal Cover impacted in the short term	-567 acres
	Changes in acres of temporary unsuitable lynx habitat in the Tres Mesa & Thirty Mile LAUs;	-828 acres
	Miles of old, non-system roads re-opened;	4.4
	Miles of new temporary road construction.	0.9

Key Issue 1. This alternative would contribute to meeting the concerns expressed by this issue, though to a lesser extent than Alternative 2. It proposed to implement salvage harvests to recover the value from dead and dying spruce on up to 6,587 acres from lands designated for this purpose under the Forest Plan. The opportunity to harvest these trees would meet the intent of the desired conditions and objectives in the Forest Plan for providing commercial forest products and supporting local economies. This alternative would also provide the opportunity to facilitate forest stand regeneration and diversity by both artificial and natural regeneration methods, but on fewer acres than Alternative 2. Removal of a portion of the dead and dying trees on the salvaged acres would also help preempt the eventual buildup of large amounts of down wood fuels that could contribute to a high severity wildfire in an area with relatively high amounts of infrastructure and developments, though the removal would occur on fewer acres than Alternative 2.

Key Issue 2. This alternative would have fewer impacts to the varieties of wildlife evaluated, since it proposes fewer acres of disturbance by harvest activities. The acres dropped from harvest consideration under this alternative were those that were determined to have the best Dense Horizontal Cover (DHC) important to lynx and other wildlife in the analysis area. This alternative would retain about 330 more acres of suitable habitat for lynx than Alternative 2. The need for fewer miles of temporary and existing roads needed to implement salvage operations on these acres would have less potential to fragment blocks of habitat that are not currently affected by roads and would disturb fewer acres. Project Design Criteria would limit the timing and extent of adverse effects, but this alternative would protect some of the best habitat in the area for a variety of wildlife.

Biological Resources

This section includes the analysis of potential effects on biological resources. Many of the reports were summarized; complete reports are located in the project record.

3.4 Forest Health

The purpose of this section is to assess the effects of the proposed Black Mesa project on forest health within the analysis area. For the purposes of this analysis, forest health is defined by the Forest Plan, specifically as "A condition where biotic and abiotic influences on the forest (i.e., insects, diseases, atmospheric deposition, silvicultural treatments, harvesting practices) do not threaten management objectives for a given Forest unit now or in the future" (USDA Forest Service 1996, p M-9).

Scope of Analysis

The forest health analysis will focus primarily on the spruce-fir dominated stands in the analysis area. These stands represent about 46 percent of the land cover within the analysis area and are found at elevations ranging from 9,800 to 11,300 feet. Other cover types represented include: aspen (21 percent), mixed conifer (1 percent), grasses and forbs (23 percent), bare ground/rock (1 percent), shrubs (5 percent) and water (3 percent)[2]. Cover type distribution in the analysis area is shown in figure 3-1, below.

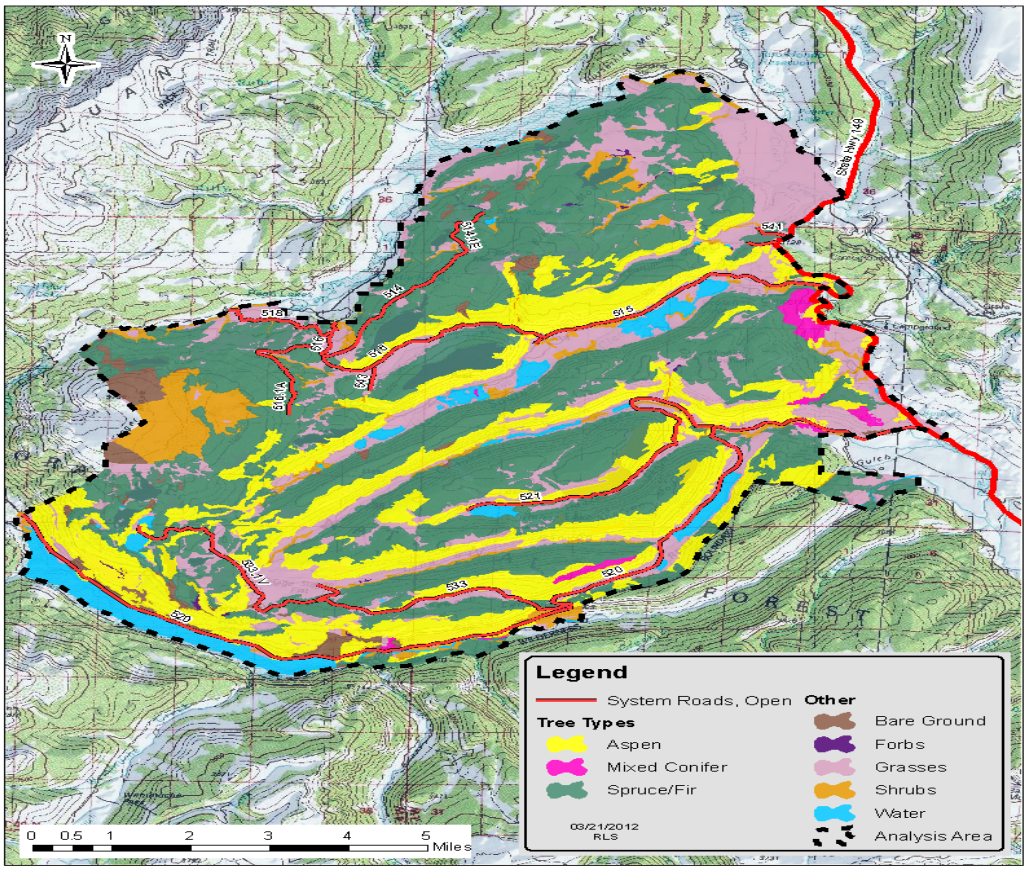


Figure 3-1. Land cover type distribution, Black Mesa analysis area.

[2] Rio Grande National Forest FSVeg database

The analysis will address forest conditions resulting from the impacts of spruce beetle (*Dendroctonus rufipennis*), and to a lesser extent *Armillaria* root disease (*Armillaria ostoyae*), western spruce budworm (*Chorisoneura occidentalis* Freeman), and windthrow.

The spruce beetle is a native insect that is responsible for substantial tree mortality on the Rio Grande National Forest and has been particularly active on the Conejos Peak and Divide Ranger Districts (Schmid and Mata, 1996). *Armillaria* root disease is a native pathogen that is present in most spruce/fir stands in the Southern Rockies and usually results in scattered, isolated patches of mortality in older stands. Western spruce budworm (WSBW) is a native insect that alters stand structure by defoliating host trees. The recent history of the Black Mesa project area will be discussed as well as potential future conditions as affected by each of the alternatives

Past Actions that have affected Existing Conditions

Influence 1: Spruce Beetle

Under most conditions, the potential for an outbreak of bark beetles is determined by three primary factors: a) current bark beetle population levels; b) the susceptibility of individual stands; and c) weather patterns. The status of these driving factors reflects the currently large amount of spruce beetle activity on the Divide Ranger District. In order for a bark beetle outbreak to occur, there must be sufficient beetles to respond to conditions favorable to spruce beetles. The extent of recent spruce beetle caused mortality in the analysis area indicates that spruce beetle populations are at a generally elevated to epidemic levels (Eager 2012)

Stand conditions are also a primary determinant of bark beetle activity. Stands that are older and denser are generally more susceptible to bark beetles. In the case of Engelmann spruce, a risk rating system derived by Schmid and Frye (1976) documented that mortality as a result of spruce beetle activity is most likely to be initiated in stands that: a) consist of larger size classes, b) are more dense (more trees per acre), c) have a higher percentage of spruce and d) stands in the higher site classes. Stands in the Black Mesa project area meet most of the criteria for stands conducive to beetle activity. The susceptibility of high-risk stands can be attributed to these large dense trees competing for sunlight and particularly, moisture. This “competition” for moisture is naturally more intense among older, denser stands of trees.

The Rio Grande National Forest experienced a severe drought within the early 2000’s (Webb et al. 2004). Low availability of moisture has generally reduced the tree’s ability to resist bark beetle attack. The overall lack of moisture allowed spruce beetle populations to increase, and has also increased the susceptibility of adjacent stands. For some insects, the end of the drought usually means the end of the outbreak. However, with mountain pine beetles and spruce beetles, once the beetles have killed a large number of trees and produced abundant offspring, their populations may become so large that they can overwhelm even the healthiest trees (Romme et al. 2006), which has become the case on this Forest (Eager 2012).

There was no evidence of significant insect or disease activity occurring in the analysis area until recently. Increased spruce beetle activity was noted in the Finger Mesa and Black Mountain areas in 2004 and 2005, respectively. Two smaller salvage sales were implemented in response. Spruce beetle activity increased again in 2010 and has spread across the analysis area at epidemic rates (see figure 2-1, chapter 2 for aerial detection survey results).

Past timber management activities (see chapter 3, Forest Management) have resulted in natural regeneration of spruce seedlings and saplings that improved age class diversity within, which has made the forest more resistant, as a whole, to spruce beetle outbreaks. Stands within the analysis area which were treated in this manner have demonstrably fewer impacts due to spruce beetles. The shelterwood preparatory and shelterwood seed cuts were essentially thinnings that reduced stand density and improved tree vigor thus reducing the susceptibility of the residual mature trees to spruce beetle infestation. The sanitation/salvage areas removed dead or dying trees which may have reduced the basal area and increased tree vigor in localized areas. The past management activities did reduce the risk of spruce beetle affecting these stands but could not protect against the elements of high beetle populations and drought-related stress.

Human activity, specifically forest management, can provide both positive and negative feedback to a stand's resistance and resiliency to spruce beetle activity. On the positive side, management activities can increase stand resistance to beetle spread prior to an outbreak by influencing the size classes, density, and species composition: Stand resiliency can also be increased by establishing younger cohorts within the stand which are not susceptible to beetle infestation (under most conditions). Such treatments must be done proactively, but as noted above cannot always stem the tide of an epidemic beetle population. Management activity can also reduce beetle spread reactively through sanitation treatments or beetle trap trees. Sanitation treatments remove insect food sources and brood by taking out recently-killed trees and/or currently-infested trees. Trap trees are utilized to draw in an existing beetle population and remove them from the stand along with the logs. These treatments are generally applied when an increase in endemic population is observed and/or windthrow has been caused by a wind event.

Influence 2: Western Spruce Budworm

Western spruce budworm (WSBW) is also a native insect; it alters stand structure by defoliating host trees rather than attacking the tree's cambium. WSBW impacts a wide variety of hosts including Douglas-fir (*Pseudotsuga menziesi*), subalpine fir (*Abies lasiocarpa*), and Engelmann spruce (*Picea engelmannii*) (Fellin and Dewey 1982). WSBW alters stand structure by defoliating understory trees, predisposing larger trees to bark beetle attack, and by diminishing the available seed sources of the host species (Hadley and Veblen 1992). Generally, budworm outbreaks are most severe in dense, multi-storied stands, as suppressed understory trees intercept budworm larvae dispersing down from overstory trees, thus making them more susceptible to defoliation damage and high mortality rates (Hadley and Veblen 1992).

There has been no evidence of substantial recent WSBW activity in the analysis area. Minor amounts of activity have been noted, but not to an extent that would affect tree vigor or form. Likewise, records from past timber management activities have not documented any concerns over budworm.

Past timber management activities may or may not have affected the current WSBW populations. The removal of some over-story trees with the past shelterwood preparatory cuts and shelterwood establishment cuts opened up stands and increased the dispersal distances of budworm larvae from overstory trees to understory trees, increasing the likelihood of predation. Past clearcuts and overstory removal prescriptions eliminated the host trees for western spruce budworm, greatly decreasing budworm activity, limiting it to the stand periphery.

Influence 3: Armillaria Root Disease

Armillaria root disease is caused by a native fungus that is present in most spruce/fir stands in the Southern Rockies and usually results in scattered, isolated pockets of mortality and windthrow in older stands. Like western spruce budworm, *Armillaria* may have originally contributed to increased susceptibility of some trees to spruce beetle attack.

As expected, there has been some evidence of past *Armillaria* occurrence within the analysis area, although management records did not document any concerns. Past timber management activities may or may not have affected the occurrence of *Armillaria* root disease within the analysis area. Partial cutting likely had multiple, conflicting influences on disease dynamics. On one hand, stumps may provide increased food to the pathogen and more energy to attack neighboring trees, but on the other hand, partial cutting can lead to increased vigor and resistance of residual trees (Mask and Worrall 2011). *Armillaria* root disease is believed to be at endemic levels in the analysis area.

Existing Condition

Influence 1: Spruce Beetle

Field surveys were completed in 2009 through 2011 by Forest timber crews and Gunnison Service Center personnel. Spruce beetle was found throughout the analysis area in large numbers, increasing steadily from south to the north. According to Forest Service Entomologist Tom Eager (pers. comm. 2012), mortality of every infested Engelmann spruce[3] tree is a near certainty because of the immense population of beetles present. Susceptible spruce trees are also likely to become infested for the same reasons. Spruce beetles also will attack blue spruce, but to a lesser extent. It's unclear whether this is because blue spruce grows in moister locations with generally lower densities or often grows in association with other species, or some other reason. To date, blue spruce seems to be attacked mainly when it is growing adjacent to Engelmann spruce.

The dramatic increase in spruce beetle activity in the analysis area highlights the severity of the prior drought conditions in this area and across the Forest, as well as extensive areas with high susceptibility to spruce beetle. Various indicators of drought severity including water yields, fuel moisture content and plant physiology indicators all set records in 2002. It is likely that these conditions facilitated the rapid increase in beetle populations and activity when this outbreak first began. Prolonged drought conditions through 2006 further endangered the stands and promoted beetle population growth.

Large spruce beetle populations in the Weminuche Wilderness, directly to the south of the analysis area, are proving to be detrimental to the stands in this analysis. Once a full-blown outbreak is underway, the huge beetle populations can engulf entire landscapes and kill practically all spruce. Such intense outbreaks are not unheard of. Landscape scale outbreaks of spruce beetle have been recorded throughout the range of spruce, including locations in Alaska, New Mexico and Utah as well as numerous examples in Colorado. The Rio Grande National Forest has experienced this phenomenon in the County Line, Burro-Blowout, Big Moose, Cumbres, and Black Mesa Project areas. Due to the predominance of spruce in the stands in the analysis area, this outbreak is expected to have broad impacts across the landscape.

[3] Unless otherwise stated, spruce will refer to Engelmann spruce.

Influence 2: Western Spruce Budworm

Recent stand data has shown WSBW has had some effects in the lower elevation mixed conifer units within the analysis area. The dense over-story of mixed conifer consisting of spruce, subalpine fir, blue spruce, white fir, and Douglas-fir has provided prime habitat for western spruce budworm to disperse downward through the canopy to understory trees. As a side-bar, incidental levels of western balsam bark beetle have also been noted within the analysis area, but likewise are not considered a concern to forest health, except when aggregated with the effects of the spruce beetle to create an undesirable forest condition, as compared with the Management Area Prescriptions for the analysis area.

Influence 3: Armillaria Root Disease

As noted above, evidence of *Armillaria* root disease has been observed in and adjacent to the Analysis Area, although extensive surveys for *Armillaria* root disease have not been completed. It appears through field reconnaissance that the root disease is likely at, or near, endemic levels. Overall, *Armillaria* is not considered a concern to forest health within this project nor to be outside the range of natural occurrence. Scattered windthrow and tree stress caused by *Armillaria* could have contributed to the buildup of spruce beetle populations within the analysis area.

Influence 4: Windthrow

Evidence of recent windthrow pockets has been observed and single-tree windthrow events are anticipated each spring in high elevation spruce/fir stands. However, no large-scale events were observed at last survey, and windthrow is not considered a concern to forest health at present. Pockets of windthrow could have been a contributing factor to the overall build-up of spruce beetle within the analysis area, but were not a driving force of their success.

Evaluation of Existing Condition

When evaluating these existing conditions in terms of forest health, it is important to understand what standard the conditions are being measured against. A quick review of the Forest Plan definition of forest health will note that it is a condition where influences do not threaten management objectives for a given Forest unit now or in the future (text abbreviated and emphasized for clarity). With the definition, the standard for forest health is determined by the management objectives for the unit under consideration. If the existing condition is in alignment with the objectives for the unit, then forest health meets the standard. If the existing condition is not in alignment with the objectives for the unit, then there is a disparity to be addressed. Some management units within the Forest are intended for events to be heavily managed for certain goals, while other units are intended to be very lightly management for other goals. This definition does not deny the benefits of natural processes, but tends to overlap between natural processes and desired conditions.

Within the analysis area, management activities fall within four Forest Plan Management Area Prescriptions (MAPs). The majority of the area falls within MAP 5.13- Forest Products. Within MAP 5.13, forest insect or disease infestations are to be evaluated against the potential for loss of commercial forest resources, with management emphasis on protecting the commercial resources (USDA Forest Service 1996, p IV-26, p IV-28). When measured against this standard, a disparity exists concerning forest health.

Direct and Indirect Effects

Alternative 1 – No Action

Units that currently have large beetle populations would continue to experience intense mortality, most likely until most of the mature spruce component is killed. During intense beetle outbreaks, the outbreak ends only when the beetles deplete their host and food supply. This scenario could be duplicated in most stands that have any spruce beetle activity at all. Even without continued drought, the currently elevated state of the spruce beetle population will continue to persist in this area for some time.

The spruce beetle outbreak currently extends beyond the analysis area boundary into Wilderness, backcountry, and other inaccessible or inoperable spruce stands within and adjacent to the analysis area. Due to the relatively contiguous suitable spruce beetle habitat, it is not unreasonable to expect spruce beetle activity to continue in the vicinity and across the landscape.

As mature stands are killed by spruce beetle the spruce seed source will be lost until understory trees mature. This loss of spruce seed would affect the future stand composition and favor subalpine fir, which is less resistant to *Armillaria* root disease. This could potentially increase the future occurrence of this root disease. WSBW may increase or decrease. The loss of over-story spruce from spruce beetle would increase dispersal distance of WSBW from remaining over-story fir, therefore populations would decrease. The loss of over-story trees would also release the suppressed understory, making the understory more resistant to defoliation. However, where spruce seed is reduced and if the future stand composition is mostly fir, since fir is a preferred host for WSBW, stands may be more susceptible in the future.

Alternative 2 - Proposed Action

This alternative proposes to salvage up to 9,410 acres. Salvage includes removal of dead or infested trees that have been impacted by spruce beetles. It is expected that salvage would have minimal impact on overall beetle numbers. The removal of trees with beetles in them could temporarily reduce the local beetle population, but it is not realistic to think that the proposed treatments would control the spruce beetle outbreak over vast areas adjacent to the treated areas.

Under Alternative 2, artificial regeneration by planting spruce is planned for approximately 1,740 acres. Spruce is susceptible to *Armillaria* root disease, but this disease usually does not affect spruce until it reaches later seral stages. Spruce does show greater resistance to the root disease than other tree species, such as subalpine fir, that could be regenerated on these sites. Harvest activity should not increase *Armillaria* root disease, since this type of pathogen does not seem to spread by infesting the surface of cut stumps with airborne spores, it spreads by root system contact (Mask and Worrall 2011). Project design criteria for protecting existing regeneration and establishing new regeneration (chapter 2, table 2.2) would be applied to all action alternatives. The increase in light and moisture following the death and removal of the overstory spruce is expected to increase the rate of height and diameter growth of the remaining seedlings and saplings (Schmid and Hinds 1974; McCaughey and Schmidt 1982).

Alternative 2 also proposes hazard tree removal 1.1 to 2.0 tree heights from open roads, fences, private land, cabins or other infrastructure. The removal of hazard trees would have the same effect as the salvage harvest.

In addition, Alternative 2 proposes fuels treatment to improve defensible space in WUI areas up to 400 feet from adjacent private land or other structures on approximately 436 acres. These treatments would focus on thinning understory trees (<8 inches dbh) and shrubs, as needed, to modify potential fire behavior. The effects of this action on spruce beetle would be minor as the spruce beetles preferred habitat is trees greater than 8 inches dbh, although some trees as small as 4 to 5 inches are being infested and killed. Removing some of the dense smaller trees, especially subalpine fir, would help reduce spruce budworm host trees thereby making these treated areas less susceptible to WSBW.

Alternative 3 – Limited Action

As with Alternative 2, this alternative would salvage dead and dying spruce (6,587 acres) along with fuel reduction treatments within WUI areas (436 acres) and removing of hazard trees around infrastructure areas. Like Alternative 2, this alternative would designate units where dead and dying spruce is removed for the primary purpose of recovering the economic value and to create areas suitable for reforestation. The effects of salvage harvesting would be the same as those described in Alternative 2, but include fewer acres.

Under Alternative 3, artificial regeneration by planting Engelmann spruce would be planned for 995 acres. The effects of *Armillaria* root disease would be the same as those described under Alternative 2, but over a smaller area.

Both hazard tree removal and fuels reduction treatments would be the same as described in Alternative 2.

Cumulative Effects

The cumulative effects analysis for forest conditions includes all of the spruce/fir forest lands on public and private lands within and around the analysis area. The analysis considers spruce beetle infestations that have been observed in this area during the last seven years and the potential for continued outbreaks over the next 5 years. The probability for current spruce beetle outbreaks in this area is high over the next 5 years due to the current weather patterns, large spruce beetle populations in the area, and current stand conditions. The spruce/fir forests in the Upper Rio Grande are currently undergoing a large amount of spruce beetle activity where thousands of acres are being affected.

The Black Mesa analysis area is surrounded to the west by research natural areas and back country areas and to the south by Wilderness. Substantial spruce beetle mortality has been observed in these areas. Research natural areas, backcountry and wilderness areas would remain untreated and natural processes would continue in these areas without human intervention.

The underlying cause of the widespread mortality is the relatively homogeneous stand structure found throughout the Rocky Mountain Region. A primary goal of forest management is to increase landscape heterogeneity so that large-scale outbreaks are not prevalent in the future forests. No increase in *Armillaria* is expected to result from management activities. WSBW outbreaks are periodic events within susceptible stands, and current weather patterns have proven to be conducive to the present budworm population. It is anticipated that WSBW activity would decrease due to the decrease in live overstory trees.

3.5 Forest Management

Forest management refers to the harvesting practices and other silvicultural treatments intended to manipulate forest vegetation to meet specific management objectives as well as the associated goal of a sustained yield of forest products.

General Forest

Scope of Analysis

This analysis focuses on the proposed management of timber stands within the analysis area to address spruce beetle infestation and timber productivity.

Past Actions that have affected Existing Conditions

Table 3-4 shows the past timber sales that have been recorded within the analysis area. Shelterwood preparatory cuts (light partial cuts) make up a large portion of the previous timber harvest activity. These treatments opened up the stands (removing about 1/3 of the basal area) to allow the present abundant natural regeneration of spruce and fir to become established. Shelterwood seed cuts removed approximately 50 percent of the original basal area. Abundant natural regeneration has also occurred in these stands. Patch clearcuts also have advanced regeneration. Even with all the previous harvest and recent salvage operation to remove infested trees, the high population of spruce beetle has infested almost all remaining spruce greater than 6 inches in diameter.

Table 3-4. Past Timber Sales in the Analysis Area.

Timber Sale	Year	Harvest Type	Acres
Kolisch Lumber Salvage Blowdown	1973	Salvage	307
Sawmill	1977	Shelterwood Prep Cut Sanitation/Salvage	1546 437
Black Mountain	1980	Shelterwood Prep Cut Sanitation/Salvage Shelterwood Seed Cut	1219 291 121
Black Mountain Dead	1980	Shelterwood Prep Cut Sanitation/Salvage	504 500
Finger Mesa	1983	Shelterwood Prep Cut	194
Minnie Mountain	1985	Shelterwood Prep Cut	1867
Crooked Canyon	1986	Shelterwood Prep Cut Shelterwood Seed Cut	2363 179
Black Mountain #II	1986	Shelterwood Prep Cut	390
Mason Salvage	1989	Shelterwood Prep Cut	10
Porcupine	1989	Shelterwood Prep Cut Sanitation/Salvage Patch Clearcuts	644 1693 93
Upper Corral	1993	Shelterwood Prep Cut	313
Corral	1993	Shelterwood Prep Cut	334
Finger Mesa Beetle Salvage	2004	Salvage	378
Black Mountain Salvage No2	2005	Salvage	601

Existing Condition

The analysis area contains some of the most productive timber growing sites found on the Rio Grande National Forest. The majority of the current structure of stands within the analysis area is primarily mature Engelmann spruce/subalpine fir. Prior to bark beetle attack, the average age

of the dominant trees within the spruce/fir stands varied between 200 to 300 years. The stands are characterized as sparse to dense, mature to over-mature timber stands, with a range of basal areas generally between 100 and 200 square feet per acre. A minor component of aspen is mixed in some of these stands.

The stand age and high percentage of spruce in the overstory have made them susceptible to spruce beetle attack under drought conditions. As shown in table 3-5, openings created by past timber harvests have regenerated to a mix of spruce and fir seedlings, saplings, and some pole-sized trees. The stand structure of some lower elevation stands can be characterized as mixed conifer with varying amounts of Engelmann spruce, subalpine fir, white fir, Douglas-fir, blue spruce, and aspen. The spruce beetle has infested most of the Engelmann spruce and to a lesser degree blue spruce within these stands. Table 3-5 also shows unit species composition.

Table 3-5. 2011 stand conditions and species composition for Alternative 2 harvest units.

Harvest Unit	Acres	Current Regeneration TPA	Percent Basal Area by Species[a]	Percent Mortality of Spruce > 8" DBH	Estimated Planted Acres
1	734	280	ES-98%, TF-2%	90-100%	350
2	474	470	ES-100%	90-100%	100
3	643	430	ES-100%	90-100%	50
4	415	525	ES-100%	90-100%	0
5	590	330	ES-90%, TF-5%, AS-5%	90-100%	100
6	435	400	ES-90%, TF-5%, AS-5%	90-100%	75
7	646	680	ES-95%, AS-5%	90-100%	0
8	564	350	ES-85%, TF-1%, AS-14%	90-100%	250
9	489	300	ES-85%, AS-15%	90-100%	150
10	382	700	ES-85%, AS-15%	90-100%	0
11	507	300	ES-80%, AS-18%, TF-2%	90-100%	160
12	334	200	ES-60%, AS-40%	90-100%	50
13	209	250	ES-85%, AS-14%, TF-1%	90-100%	100
14	130	250	ES-78%, AS-20%, TF-2%	90-100%	75
15	376	250	ES-68%, AS-26%, TF-6%	90-100%	125
16	306	300	ES-90%, AS-8%, TF-2%	90-100%	100
17	6	350	ES-70%, AS-30%	90-100%	0
18	312	900	ES-96%, AS-3%, TF-1%	90-100%	0
19	137	630	ES-94%, AS-5%, TF-1%	90-100%	30
20	209	1405	ES-70%, AS-29%, TF-1%	90-100%	25
21	285	1450	ES-56%, AS-43%, TF-1%	90-100%	0
22	97	650	ES-80%, AS-20%	90-100%	20
23	385	2000	ES-74%, AS-25%, TF-1%	90-100%	0
24	203	1000	ES-77%, AS-16%, TF-7%	90-100%	0
25	87	1000	ES-77%, AS-16%, TF-7%	90-100%	0
26	455	1000	ES-70%, AS-29%, TF-1%	90-100%	75

[a] Species codes= ES- Engelmann spruce; TF –true firs (primarily subalpine fir); AS – aspen.

Direct and Indirect Effects

Alternative 1 – No Action

Under this alternative, no salvage of beetle infested or killed timber would occur. The economic value of spruce beetle-killed/infested trees would not be realized. Regional and Forest Objectives listed in chapter 1 would not be met. Forest Plan desired conditions for MAP 5.13 would not be met under this alternative.

With the loss of the Engelmann spruce seed source due to beetle kill, it can be expected that many residual stands would tend toward dominance by subalpine fir, depending on their current composition. Some openings (gaps) would be created when dead trees fall. Depending on the density of the dead overstory, growth of understory trees would affected due to less sunlight and falling trees would continue to potentially damage residual trees for the next 30+ years (Schmid and Hinds 1974). Aspen, if present, may sprout in openings (gaps) created by the mortality of spruce. In stands where timber production is the objective, stands dominated by subalpine fir rather than spruce are less desirable for the following reasons: a) fir has a shorter life span than spruce, b) fir is more susceptible to more insect and disease attacks than spruce, c) the structural characteristics of the wood fiber are inferior to spruce, and d) it has less economic value than spruce.

By not salvaging dead and dying spruce, approximately 35 to 60 MMBF of National Forest timber would not be utilized for wood products or contribute to sustained yield of forest products. The public may be able to obtain an equivalent amount of wood products from other sources, including from private land or other countries.

Fuels reduction treatments would not occur within WUI areas up to 400 feet from adjacent private land or other structures. Fuels treatment areas along roads and private boundaries would retain dense understory vegetation. Some of the beetle killed spruce along these open roads would likely be cut as firewood by the public leaving slash along the road right-of-way.

Hazard tree removal may not occur within 1.1 to 2.0 tree heights from open roads, fences, private land, cabins or other infrastructure such as campgrounds or developed sites. Again, some of these hazards trees may be cut for firewood.

No roads would be planned for decommissioning under this alternative.

Alternative 2 – Proposed Action

This alternative provides the opportunity to salvage dead and dying spruce along with fuel reduction treatments within WUI areas and removing hazard trees around infrastructure areas. Harvesting would be accomplished with ground-based (tractor) logging methods through a variety of large and/or small sales, including public/commercial firewood-gathering areas.

The intent of the salvage is to place timber on the market for the American public in time to capture the value of the beetle-killed spruce trees, before the effects of wood decay eliminates that value. The object of the silvicultural prescription would be to harvest spruce trees eight inches Diameter at Breast Height (DBH) and larger within the salvage units, which were recently killed by, or are currently infested with, spruce beetle. No green, uninfected spruce trees would be harvested, and no green or dead subalpine fir would be harvested. Exceptions to this are those trees that must be removed from skid trails, landings, or hazard trees for safety reasons.

The minimum number of spruce/fir snags, live fir, and live uninfested spruce to be left is specified in the Project Design Criteria (chapter 2, table 2-2). Treated stands are expected to have a below-average susceptibility of windfall risk; having been previously managed, these trees have been exposed to lower stocking densities and have developed wind firmness over time. However, some windthrow of remaining larger trees is expected following this treatment. Trees most susceptible to windthrow would be residual live overstory fir, which have less wind

resistance than snags. A loss of these trees to windfall would not affect management objectives or future management activities within the analysis area.

Though project harvest objectives are to salvage dead and dying spruce, the extent of mortality in most stands would result in a regeneration harvest. Following removal of the dead or dying spruce, the Forest Service would evaluate residual stocking in comparison to minimum Forest Plan standard of 150 trees per acre, desired species composition, and overall distribution. Although stand averages seem good, not every acre is uniformly stocked; some areas are high, some areas are low. Harvest activities are generally not expected to create under-stocked areas. The logging process itself would provide the necessary soil scarification, allowing any available seed to reach mineral soil, and helping prepare the sites for planting. Light logging slash left in the woods would be used to benefit young seedlings by protecting them from excessive sunlight, extremes of temperature, desiccation, and grazing animals (Smith et al. 1997). It is anticipated that about 1,740 of the harvested acres could require planting based on existing stand data. Actual planting acres would be determined through regeneration surveys following management activities. It is estimated that aspen could regenerate on up to 2,415 acres, though if aspen regeneration is less than desired, these acres would also be planted. Forest Plan desired conditions for MAP 5.13 would be met under this alternative.

Some openings (gaps) would be created in the units. An opening in a forest canopy is associated with the death, blow-down, or other removal of all or a significant portion of the over-story trees. These gaps are often characterized by high structural and species diversity due to the growth of understory flora and colonization of new species, which are facilitated by the microclimatic conditions of the gap (Dunstar 1996). The increased availability of light and moisture is expected to result in an overall increase in the growth rate and vigor of residual seedlings and saplings with the speed of release depending on the age and health of the understory tree, since younger trees will generally respond more quickly (McCaughey and Schmidt 1982).

In this alternative approximately 50 to 60 MMBF would be harvested from up to 9,410 acres. This alternative would contribute to long term sustained yield of forest products. The estimation of timber volume that would be removed is derived from: 1) stand exam data taken in 2003 and 2011, 2) this stand exam data projected to 2012 by the Forest Vegetation Simulation, Central Rockies Variant, and 3) field surveys in 2011 which were used to estimate the percent of infested spruce trees. All of these sources are subject to some error. There is also the uncertainty whether or not the beetles will attack 100% of the spruce trees in those stands not already heavily infested. Therefore, these volumes must be considered our best estimates, subject to change. More precise data would come when the timber is actually cruised during the sale preparation process.

Also within this alternative, 436 acres of fuels reduction treatments is planned within WUI areas up to 400 feet from adjacent private land. Treatments will reduce surface, ladder, and canopy fuels (i.e. fuel loading) to decrease the potential for severe wildfire and the likelihood of wildfire spreading between National Forest and private lands. Ladder and canopy fuels (shrubs as well as seedling, sapling, and pole sized trees) would most likely be thinned by hand-felling techniques and pile burning or, where practical, machinery equipped with cutting or grinding heads. The effects of this action on existing vegetation would decrease tree density and improve tree vigor of the remaining trees, making them more resistant to insects and disease.

Hazard tree removal would be implemented within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins, or other infrastructure. Hazard distance would depend

on localized factors such as slope, topography, and/or the number and arrangement of potentially hazardous trees. Where feasible, these trees would be cut and removed as part of timber harvest activities or removed as firewood by adjacent landowners; otherwise they will be felled, bucked, and left in place. Both fuels treatment and hazard trees could consist of cutting vegetation with chainsaws and handpiling slash or grinding it with mechanized equipment. Any slash piles created would be burned during favorable weather conditions. As with Alternative 1, some of the beetle killed spruce along these open roads would likely be cut as firewood by the public leaving slash along the road right-of-way.

The project design criteria (chapter 2, table 2-2) are routinely implemented in timber sales on the Forest. The design criteria are feasible because they can be incorporated into existing timber sale contract provisions. The design criteria have proven to be an effective means of assuring regeneration, and providing for resource protection.

Alternative 3 – Limited Action

As with Alternative 2, this alternative provides the opportunity to salvage dead and dying Engelmann Spruce (6,587 acres) along with fuel reduction treatment within WUI areas (436 acres) and removing hazard trees around infrastructure areas.

This alternative would produce an estimated volume of 35 to 45 MMBF. Reforestation through artificial regeneration may occur on approximately 995 acres of non-stocked or under-stocked areas. It is estimated that aspen could regenerate on up to 1,902 acres, though if aspen regeneration is less than desired, these acres would also be planted. Actual planting acres would be determined through regeneration surveys following management activities.

Harvesting would be accomplished with ground-based (tractor) logging methods through a variety of large and/or small sales, including public/commercial firewood gathering areas.

Alternative 3 would salvage 2,823 fewer acres and regenerate spruce on 745 fewer acres through harvest activities then Alternative 2.

Although less acres are being treated within this alternative, the effects of salvage harvest for the removal of trees killed or infested by spruce beetle have already been described under Alternative 2.

The effects of fuels reduction treatments and hazard tree removal are the same as described in Alternative 2.

Cumulative Effects

Since most of the roads needed to harvest the timber are already in place, new road construction would not be a major factor affecting forest management decisions and alternative viability. Prompt removal of the dead trees, followed by replanting new trees where needed, would accelerate the process towards getting these lands back to a desired condition of being forested with commercially-preferred species.

All action alternatives would contribute toward maintaining a sustainable supply of forest products to timber industry. When added to other past, present and future sales, the proposed

harvest activities would not exceed annual Forest Plan Allowable Sale Quantity for either softwoods or aspen and therefore would remain within the FEIS analysis for the Forest Plan.

With the exception of minor amounts of blow-down salvage, no future timber harvests are anticipated in the salvage units in the foreseeable future. Additional hazard trees on private land may be removed to protect private land resources and infrastructures. A summary of the acres of treatment for present and future timber harvest is presented in table 3-6.

Table 3-6. Present and Future Timber Harvest

Timber Sale	Acres	Year(s)	Harvest Objective
Present	9,410	2013-2017	Salvage

Past management activities have created age, structural, and species diversity throughout the Analysis Area. See past management activities displayed in table 3-4.

Old Growth

Existing Condition

None of the forested stands proposed for treatment meet the criteria for old growth as defined by Mehl (1992). Presently, the spruce stands do not meet the minimum age, size, and live density requirements to be old growth due to the extensive spruce beetle mortality.

Direct, Indirect, and Cumulative Effects

No alternative would be expected to negatively affect old growth since none currently exists. Over the long term, no alternative would be expected to create a cover type conversion or create a permanent land-use allocation change on the landscape. Thus, no alternative is expected to preclude the future development of old growth over time.

3.6 Wildlife

Scope of the Analysis

The scope of this analysis discusses several categories of wildlife: 1) Threatened and Endangered Species; 2) Region 2 Designated Sensitive Species; 3) Forest Management Indicator Species (MIS); 4) Migratory Birds - Bird Conservation Area 16; and 5) General Wildlife.

The analysis was conducted for various species at the following scales:

a) Canada lynx –The Tres Mesa and 30-Mile Lynx Analysis Units (See Map B-3, appendix B for LAU locations and suitable lynx habitat).
b) MIS – The Forest Level
c) All other species – Within the Black Mesa Analysis Area as described in chapter 1.

This section summarizes a more detailed analysis contained in the Wildlife Report and Effects of Alternatives Document prepared for the Black Mesa project which is part of the project record.

Past Actions that have affected Existing Conditions

The existing condition in the analysis area has been impacted by historic activities, including timber harvesting, grazing, and various recreational activities. Within the last several years, a severe spruce beetle epidemic has impacted spruce-fir stands, as described under Forest Health, section 3.4.

Existing Condition

The current composition of stands in the analysis area consists of two separate habitat types

Spruce-fir - Spruce-fir and Dense Horizontal Cover (DHC) is more prevalent in the north end of the analysis area mainly in the Tres Mesa Lynx Analysis Unit (LAU). A diversity of both managed and unmanaged forested habitat types has resulted in a mosaic of habitat types being available for wildlife species.

Wildlife surveys have shown that this habitat type contains a rich diversity of bird species with generalist species being common and those more adapted to mature spruce-fir forests being present including Brown Creeper, Ruby Crowned Kinglet and White-Crowned Sparrow being common. Surveys documented use by snowshoe hares along with Red Squirrels, Boreal Owls, Pine Marten and Red-Backed Voles. Table 3-13 displays the species documented during field surveys within the analysis area.

Aspen/Spruce-fir - This habitat type is more prevalent in the south end of the analysis area, mainly in the 30-Mile Lynx Analysis Unit.

Wildlife surveys have shown that this habitat type contains a good diversity of bird species including aspen dependent species such as Warbling Vireo and Yellow-Rumped Warblers. Surveys did document some snowshoe hare use in this habitat type during the summer, mainly in stands containing a larger component of younger aged spruce-fir.

Direct and Indirect and Effects

Tables 3-6 and 3-7 are a comparison of the potential effects upon lynx habitat for the Tres Mesa and 30-Mile LAUs. Table 3-8 is a summary of the findings for all Threatened and Endangered (T&E) species.

Threatened and Endangered species

The Wildlife Report considered four T&E species and determined that suitable and or potential habitat exists for one species, the Canada lynx. Canada lynx was further analyzed in each alternative. Mexican Spotted Owl, Southwestern Willow Flycatcher, and Uncompahgre Fritillary Butterfly were not further analyzed due to lack of suitable habitat present within the Analysis Area. ***For this project, there will be No Effect to the Mexican Spotted Owl, Southwestern Willow Flycatcher, or Uncompahgre Fritillary Butterfly or their habitat***.

The Black Mesa analysis area occurs within the boundaries of three LAUs: Tres Mesa, 30-Mile, and Stoney Pass. However, no activities are proposed in Stoney Pass and no changes would occur. As directed in the Southern Rockies Lynx Amendment (SRLA), potential effects on Canada lynx were assessed by comparing the LAU baseline conditions to changes predicted from the alternatives. The potential impacts discussed below are summarized for lynx.

Specific Alternative Effects

Alternative 1- No Action

It is important to keep in mind that the main factor influencing lynx habitat is the spruce beetle itself, activities associated with the Black Mesa Project are then additive.

Under this alternative there are no potential direct effects upon lynx, as no additional activity would occur. The amount of quality habitat would most likely slowly convert into a lesser quality of habitat type in the short term, but depending on the amount of tree regeneration and existing DHC, would remain suitable lynx habitat. Through time, a patchy distribution of deadfall, standing dead and newly regenerating trees and shrubs would likely develop across the landscape. Some areas would improve in quality as more coarse woody debris becomes available for denning, and as areas open and the understory vegetation is released. Other areas may become relatively unsuitable habitat, which lynx may only move through to access other, more favorable areas.

There would be no impact upon lynx movement in the area and no additional road work would occur. Overall, this alternative offers lynx and lynx habitat perhaps the best opportunity for a continued mosaic pattern across the landscape offering a mixture of habitat types as natural processes occur.

This action would not introduce vegetation management as an additional factor potentially affecting lynx foraging, movement, or reproduction. Conversely, this alternative would not offer land managers an opportunity to examine the influence of management techniques upon lynx habitat and lynx use of the area.

DETERMINATION for ALTERNATIVE 1: This alternative allows natural processes to occur which may cause habitat to become unsuitable for a period of time. However, over time, natural processes would create a mosaic across the land providing for a variety of habitat types for lynx and snowshoe hare. It is determined that this Alternative would have **NO EFFECT** upon lynx or lynx habitat as the understory remains intact.

Direct and Indirect Effects Common to Both Action Alternatives

a) Salvage Harvesting

Direct Effects on Species - Direct effects are those directly impacting lynx or their primary prey as the result of salvage harvesting activities. Direct impacts may range from temporary disturbance due to salvage harvest and possible, but unlikely, direct mortality resulting from salvage activities.

Noise disturbances associated with the proposed action may reduce lynx use of the immediate harvest areas while harvest and post-harvest activity is occurring. Disturbances are expected to subside thereafter, with increased use of the post-harvest areas likely occurring immediately following the activity as long as adequate habitat, in particular DHC, is remaining on site.

Lynx kittens are vulnerable when very young and/or could be present nearby or in den sites while salvage operations are taking place and could potentially be injured or killed by logging equipment and activities. However, it is unlikely that logging would occur during this time period (approximately April to late June), within those areas most likely to contain an active den (Spruce-fir) due to wet soil conditions. As a further precaution, Project Design Criteria would be in place to restrict harvest activities from May 1 to July 1 to minimize disturbance to lynx kittens and other species.

Indirect Habitat Effects - The indirect effects of the proposed action would have temporary influences on lynx and their primary prey species. Reduced foraging opportunities within the treatment areas may occur in proportion to the amount of prey species displacement and/or reductions in prey habitat. Reduced winter foraging and denning opportunities would occur due to the reductions in potential large coarse woody debris as trees fall and further changes in canopy closure. However, it is important to keep in mind that the main factor affecting lynx habitat is the influence on habitat by the spruce-beetle itself; the activities associated with the Black Mesa Project are then additive.

In salvage units, the degree of beetle infestation per stand varies from 20 to 100 percent, depending on the percent of spruce in the overstory, with the majority of units being close to 100 percent, unless aspen is present. Canopy closure is being reduced in each unit, regardless if salvage occurs or not and would result in more open stand conditions that would release existing understory vegetation (shrubs and seedlings). This release would be most prevalent in salvage units in which small to medium sized openings are created.

In general, the action alternatives would both reduce habitat attributes that are preferred by lynx and their primary prey species (i.e. down woody debris and Dense Horizontal Cover (DHC)). In some cases, depending on the amount of DHC currently present and the amount impacted, the action alternatives may result in converting suitable habitat into a Stand Initiation Structural Stage (unsuitable habitat). The various acres and percentages of habitat change are detailed for each alternative in tables 3-6 and 3-7.

Impacts to both developing understory and DHC are similar for both action alternatives, but vary depending upon the amount of acres of salvage harvesting proposed. Regardless, the amount of damage to DHC and developing understory is estimated to average approximately 30%. In most cases, the amount of projected damage to developing understory is not expected to substantially set back the individual units ability to provide DHC in the short term (10 years) due

to the relatively high numbers of understory trees that would remain following salvage (see table 3-5, Forest Management section).

Benefits – The harvest of trees, including dead trees, is not necessarily a negative impact upon lynx habitat. The SRLA recognizes that vegetation management could be utilized to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx (VEG O1). Vegetation management could be used to provide a mosaic of habitat conditions through time that supports DHC, and high densities of snowshoe hare, providing winter snowshoe hare habitat in both the Stand Initiation Structural Stage and in mature, multi-story conifer vegetation (VEG O2). Vegetation management activities could be focused in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack DHC (VEG O4).

b) Effects from fuels reduction, tree planting, and use of gated roads, new road construction and road decommissioning.

Direct Effects on Species – Direct effects upon lynx from fuel treatments is fairly limited (both spatially and temporally) and consists mainly of limited temporary disturbance. Thinning would be by hand utilizing chainsaws or limited mechanized means, which would limit the amount of potential direct impact.

Indirect Habitat Effects – The purpose and intent of fuels reduction is to reduce the wildfire danger by creating areas of less fuel to aid in preventing, stopping or slowing a wildfire should one occur. The majority of this activity would be within 400 feet of private property. The majority of fuels to be removed include ladder fuels which can also be considered to be dense horizontal cover (DHC) for snowshoe hare. In all cases, it is assumed that fuels reduction would result in temporarily converting all habitat types into a stand initiation structural stage.

Alternative 2- Proposed Action

The general direct and indirect potential impacts of salvage harvesting and on lynx and lynx habitat has been discussed previously. Comparison of the alternatives is mostly a factor of the number of acres being impacted by each alternative's activities and then comparing those acres by alternative to the LAU's Environmental Baseline and contribution towards the Forest's exemptions and exceptions.

This alternative involves a larger number of acres to be salvaged than Alternative 3. The number of acres of fuels reduction would be the same as Alternative 3 and miles of new and temporary roads would be higher than Alternative 3. This alternative would result in a larger amount of lynx habitat potentially impacted and would add more acres than Alternative 3 to the individual exemptions and exceptions on a LAU and Forest-Wide Scale. See tables 3-6 and 3-7.

Exemptions and Exceptions under the SRLA

Tres Mesa LAU: Alternative 2 involves approximately 9,410 acres of Salvage Harvest. Harvesting these acres will convert 627 acres of currently suitable habitat into a Stand Initiation Structural Stage. New road construction (2.0 miles of new open road and 3.6 of new temporary road) will also add to the amount of unsuitable habitat (SISS) by an additional 6.0 acres. Fuels treatments would add another 326 acres to the LAU, increasing the amount of unsuitable habitat

in the Tres Mesa LAU from 1,788 (4.27%) to 2,835 (6.77%). These acres are included in the acre figures and percentages above.

30-Mile LAU: Salvage activity as part of Alternative 2 would not increase the amount of temporarily SISS within the LAU. However, 110 acres of fuels treatments are included within the LAU and would increase the amount of SISS by 110 acres, increasing the amount of unsuitable habitat in the 30-Mile LAU from 143 (0.37%) to 253 acres (0.66%). These acres are included in the acre figures and percentages above.

Forest-Wide: Harvesting within these acres will impact 757 acres of Dense Horizontal Cover reducing the Forest's cap limitation under S6 Exception 3 to 2,997 acres. The Forest would remain within the Standards and Guidelines as described within the Southern Rockies Lynx Amendment.

Alternative 2 would result in an additional 4,219 acres added to the Forest-Wide WUI exemption. These acres consist of 436 acres of strictly fuels treatments and another 3,783 acres of salvage within a 1-mile WUI buffer. The Forest's cap limitation under WUI exemptions will be reduced from 28,996 to 24,777.

Alternative 3 – Limited Action

The general direct and indirect potential impacts of salvage harvesting upon lynx and lynx habitat has already been discussed. Discussion of the potential impacts by alternative is a comparison of the activity acres involved for each alternative.
Of the two action alternatives, this alternative proposes fewer acres of salvage. The number of acres of fuels reduction would be the same as Alternative 2. This alternative would result in less potential impact upon lynx habitat than Alternative 2 and would add fewer acres to the individual exemptions and exceptions on a LAU and Forest-Wide Scale.

Those acres removed from harvest consideration under Alternative 3 are those acres identified to be of highest value to wildlife as determined by field surveys completed by the ID Team Wildlife Biologist and Wildlife Field Technicians. These surveys were completed during the 2010 and 2011 field seasons. The acres removed from harvest consideration involved areas containing the highest quality of DHC (lynx, marten, snowshoe hare..) and areas providing security and travel cover (elk, lynx..). Additionally, areas in which a road system does not currently exist were removed from harvest consideration (big game, lynx…). Removing these areas from harvest consideration reduces the overall miles of temporary roads needed, which would maintain habitat effectiveness on these acres.

This alternative was designed to be more restrictive as far as its potential for impacting DHC and to better protect the integrity of potential wildlife corridors from west to east across Highway 149. Alternative 3 management actions would result in more of a mosaic across the landscape than Alternative 2.

Exemptions and Exceptions under the Southern Rockies Lynx Amendment

Tres Mesa LAU: Alternative 3 involves approximately 6,587 acres of Salvage Harvest. Harvesting these acres would convert 391 acres of currently suitable habitat into a Stand Initiation Structural Stage. New road construction (0.9 miles) will also add to the amount of unsuitable habitat (SISS) by an additional 1.0 acre. Fuels treatments will add another 326 acres

to the LAU, increasing the amount of unsuitable habitat in the Tres Mesa LAU from 1,788 (4.27%) to 2,506 acres (6.0%). These acres are included in the acre figures and percentages above.

30-Mile LAU: Salvage activity as part of Alternative 3 would not increase the amount of temporarily SISS within the LAU. However, 110 acres of fuels treatments are included within the LAU and would increase the amount of SISS by 110 acres, increasing the amount of unsuitable habitat in the 30-Mile LAU from 143 (0.37%) to 253 acres (0.66%). These acres are included in the acre figures and percentages above.

Forest-Wide: Harvesting within these acres would impact 567 acres of Dense Horizontal Cover reducing the Forest's cap limitation under S6 Exception 3 to 3,187 acres. The Forest would remain within the Standards and Guidelines as described within the Southern Rockies Lynx Amendment.

Alternative 3 would result in an additional 2,297 acres added to the Forest-Wide WUI exemption. These acres consist of 436 acres of strictly fuels treatments and another 1,861 acres of salvage within a 1-mile WUI buffer. The Forest's cap limitation under WUI exemptions will be reduced from 28,996 to 26,699.

DETERMINATION for ALTERNATIVES 2 AND 3: It is determined that both Alternatives 2 and 3, "**MAY AFFECT, but are NOT LIKELY to ADVERSELY AFFECT**" the Canada lynx or its primary habitat. The rationale for this conclusion is:

Project design criteria would be in place to protect dense horizontal cover and minimize potential effects on lynx and their primary habitats in salvage areas in a manner consistent with the SRLA.
The action Alternatives would both result in varying amounts of lynx habitat being converted into SISS as described in tables 3-6 and 3-7.

Both action alternatives would increase the amount of unsuitable habitat within the LAUs and will remain in full compliance with the SRLA Vegetation Standards.

Both action alternatives would add to the exemptions and exceptions within the SRLA, however, the LAUs would remain in full compliance with the SRLA Vegetation Standards.

In the long term, the action alternatives have the potential to increase multi-storied stands with dense horizontal cover preferred by snowshoe hare. These conditions are expected to last for a period of two to three decades.

Table 3-6. Expected change to LAU Baseline by action alternative, Tres Mesa LAU. Existing baseline source is the April 2011 Revised Lynx Habitat Model

TRES MESA LAU Alternative Comparison	**Existing Baseline**	**Alternative 2**	**Alternative 3**
Description	**Acres (%)**	**Acres (%)**	**Acres (%)**
Total Acres	93,817 (100%)	93,817 (100%)	93,817 (100%)
Total Acres of Lynx Habitat	41,869 (44.63%)	41,869 (44.63%)	41,869 (44.63%)
Acres of Suitable Habitat	40,081 (95.73%)	39,034 (93.23%)	39,363 (94.00%)

Table 3-6. Expected change to LAU Baseline by action alternative, Tres Mesa LAU. Existing baseline source is the April 2011 Revised Lynx Habitat Model

TRES MESA LAU Alternative Comparison	**Existing Baseline**	**Alternative 2**	**Alternative 3**
(see map B-3, appendix B for suitable habitat)		(-1,047 acres: 715 acres salvage; 6 acres of road; 326 acres of fuels treatments).	(-718 acres: 391 acres salvage; 1 acre of road; 326 acres of fuels treatments).
Acres of Unsuitable Habitat /Stand Initiation Structural Stage.	1,788 (4.27%)	2,835 (6.77%) (Increase of 1,047 acres).	2,506 (6.00%) (Increase of 718 acres).
Meets VEG S1 – No more than 30% of the lynx habitat in an LAU currently in Stand Initiation Structural Stage.	Yes – 4.27%	Yes – 6.77% (Increase of 2.5%)	YES – 6.00% (Increase of 1.73%).
Meets VEG S2 – Timber mgmt projects shall not regenerate more than 15% of lynx habitat in a ten-year period.	YES	Yes	YES
Dense Horizontal Cover; Acres of treatments under Exceptions 1-4 in VEG S5 and Exceptions 1-3 in VEG S6 (0.5%). Forest-Wide current cap of 3,754 (Trujillo Meadows Baseline).	3,754 acre cap	2,997 acre cap (757 acres impacted)	3,187 acre cap (567 acres impacted)
Wildland Urban Interface; Acres of treatment within WUIs under exemptions to VEG S1, S2, S5 or S6 (3.0%). Forest-wide cap of 28,996 (Big Moose).	28,996 acre cap	24,777 acre cap (4,219 acres impacted)	26,699 acre cap (2,297 acres impacted))
Acres of Total Treatment under Exemptions and Exceptions to VEG S1, S2, S5 or S6 (4.5%) or 44,362 Forest-Wide (from Trujillo Meadows).	44,362 acre cap	37,386 acre cap (4,976 acres impacted)	39,499 acre cap (2,864 acres impacted)

Table 3-7. Expected change to LAU Baseline by action alternative, 30-Mile LAU. Existing baseline source is the April 2011 Revised Lynx Habitat Model

30-MILE LAU Alternative Comparison	**Existing Baseline**	**Alternative 2**	**Alternative 3**
Description	**Acres (%)**	**Acres (%)**	**Acres (%)**
Total Acres	63,249 (100%)	63,249 (100%)	63,249 (100%)
Total Acres of Lynx Habitat	38,630 (61.07%)	38,630 (61.07%)	38,630 (61.07%)
Acres of Suitable Habitat	38,486 (99.63%)	38,376 (99.34%) (110 acres impacted by fuels treatments)	38,376 (99.34%) (110 acres impacted by fuels treatments)
Acres of Unsuitable Habitat /Stand Initiation Structural Stage.	143 (0.37%)	253 (0.66%)	253 (0.66%)
Meets VEG S1 – No more than 30% of the lynx habitat in an LAU currently in Stand Initiation Structural Stage.	YES – 0.37%	YES – 0.66%	Yes – 0.66%

Table 3-7. Expected change to LAU Baseline by action alternative, 30-Mile LAU. Existing baseline source is the April 2011 Revised Lynx Habitat Model

30-MILE LAU Alternative Comparison	**Existing Baseline**	**Alternative 2**	**Alternative 3**
Description	**Acres (%)**	**Acres (%)**	**Acres (%)**
Meets VEG S2 – Timber mgmt projects shall not regenerate more than 15% of lynx habitat in a ten-year period.	YES	YES	YES
Dense Horizontal Cover; Acres of treatments under Exceptions 1-4 in VEG S5 and Exceptions 1-3 in VEG S6 (0.5%). Forest-Wide current cap of 3,754 (Trujillo Meadows Baseline).	3,754 acre cap	2,997 acre cap (757 acres impacted)	3,187 acre cap (567 acres impacted)
Wildland Urban Interface; Acres of treatment within WUIs under exemptions to VEG S1, S2, S5 or S6 (3.0%). Forest-wide cap of 28,996 (Big Moose).	28,996 acre cap	24,777 acre cap (4,219 acres impacted)	26,699 acre cap (2,297 acres impacted)
Acres of Total Treatment under Exemptions and Exceptions to VEG S1, S2, S5 or S6 (4.5%) or 44,362 Forest-Wide (from Trujillo Meadows).	44,362 Baseline	37,386 acre cap (4,976 acres impacted)	39,499 acre cap (2,864 acres impacted)

Conservation Measures: Measures for minimizing influences on lynx habitat were built into the proposed action for both action alternatives and are described in the Project Design Criteria, chapter 2.

Table 3-8. Determination and conservation measures summary

Species	**Determination**	**Rationale**	**Conservation Measures**
Canada lynx (T) *Lynx canadensis*	Alternative 1 – NE Alternative 2 – NLAA Alternative 3 – NLAA	For alternatives 2 and 3, the projected effects of the various management activities associated within the Black Mesa Vegetation Management Project are consistent with those in the programmatic biological consultation (Programmatic Biological Opinion for the effects of the SRLA on the Canada Lynx 2008). All exemptions and exceptions within the Southern Rockies Lynx Amendment will remain under the allowances both at the LAU scale and Forest-Wide. All Standards and Guidelines within the Southern Rockies Lynx Amendment will continue to be met.	See Project Design Criteria
Mexican spotted owl (T) *Strix occidentalis lucida*	All Alternatives - NE	No habitat within analysis area.	N/A
Southwestern willow flycatcher (E) *Empidonax trailii extimus*	All Alternatives - NE	No habitat within the analysis area.	N/A

Table 3-8. Determination and conservation measures summary			
Species	**Determination**	**Rationale**	**Conservation Measures**
Uncompahgre fritillary butterfly (E) *Boloria acrocnema*	All Alternatives - NE	No habitat within the analysis area.	N/A
NE – No Effect; NLAA – May Affect, Not Likely to Adversely Affect; LAA – Likely to Adversely Affect			

Cumulative Effects:

The cumulative effects analysis for the Black Mesa Project is based on future State and private land activities that are reasonably certain to occur within the Tres Mesa and 30-Mile LAUs.

Projects within the LAUs in the past ten years have primarily involved outfitter-guide permit re-issuances and cattle allotment permit renewals. Two small timber management projects have occurred within the Tres Mesa LAU - the Black Mountain Salvage and Finger Mesa Salvage Sale in the last ten years. The impacts of these projects upon lynx habitat are included in the LAU's Environmental Baseline.

Approximately 1,045 acres are classified as suitable lynx habitat on private and state lands (no Tribal Lands) in the Tres Mesa LAU. Any activity on these lands potentially impacting lynx habitat would be small scale and not expected to impact the overall functionality of the LAU which will continue to be within the established habitat thresholds contained within the Southern Rockies Lynx Amendment. There should be sufficient adjacent cover remaining within the forested matrix that the general area and the overall LAU will continue to function and will provide sufficient lynx foraging habitat.

Approximately 344 acres are classified as suitable lynx habitat on private and state lands (no Tribal Lands) in the 30-Mile LAU. Any activity on these lands potentially impacting lynx habitat will be small scale and is not expected to impact the overall functionality of the LAU which will continue to be within the established habitat thresholds contained within the Southern Rockies Lynx Amendment. There should be sufficient adjacent cover remaining within the forested matrix that the general area and the overall LAU will continue to function and will provide sufficient lynx foraging habitat.

Any planned projects on private land in the foreseeable future that may impact lynx habitat will be re-analyzed and tracked to the specific LAU.

In summary, this cumulative effects analysis suggests that in combination with all past, proposed, and foreseeable future projects within the LAUs, all standards and guidelines, exemptions and exceptions contained within the SRLA pertaining to habitat thresholds would be met with the implementation of this project. Therefore, potential cumulative effects would not influence the overall effects determination.

Region 2 Designated Sensitive Species

Species having no suitable habitat within the analysis area are not analyzed in further detail. *This project will have **NO IMPACT** on the Great Basin silverspot butterfly, bald eagle, ferruginous hawk, northern harrier, flammulated owl, sage sparrow, Brewer's sparrow, Lewis's woodpecker, peregrine falcon, Loggerhead shrike, white-tailed ptarmigan, mountain plover, burrowing owl, black swift, Townsends's big-eared bat, fringed myotis, Gunnison's prairie dog, and the New Mexico Jumping Meadow Mouse.*

Pre-field reviews and habitat surveys determined that suitable habitat exists for the eight species described in table 3-9, below. These eight species are further analyzed for each alternative for the Black Mesa project.

Table 3-9. Summary of findings Region 2 Sensitive Species with habitat in Black Mesa Analysis Area.

Species	General Habitat	ALTERNATIVES		
		1	2	3
AMPHIBIANS				
Western boreal toad *Bufo boreas boreas*	Riparian	NI	MI	MI
Northern leopard frog *Rana pipiens*	Riparian	NI	MI	MI
BIRDS				
Northern goshawk *Accipiter gentiles*	Forests	NI	MI	MI
Boreal owl *Aegolius funereus*	Montane Forests	NI	MI	MI
Olive-sided flycatcher *Contopus borealis*	Snag, Coniferous Forests	NI	MI	MI
MAMMALS				
American Marten *Martes Americana*	Forests	NI	MI	MI
Wolverine *Gulo gulo*	Remote subalpine and spruce/ fir forests	NI	MI	MI
Bighorn Sheep *Ovis Canadensis*	Cliffs and Mountain Slopes	NI	MI	MI

NI = No Impact; MI = May Impact Individuals, but is not likely to cause a trend towards Federal listing or result in loss of viability in the planning area.

Alternative 1- No Action

Under this alternative there are no potential direct impacts upon the nine sensitive species addressed, as no additional activity would occur which could result in direct mortality. Indirect impacts upon habitat would be positive for some species in the short term and negative for others. Beetle infested areas would slowly convert into more open habitat to the detriment of amphibians and several of the avian species (i.e. boreal owl) and mammal species in the short term, but this same impact would be beneficial to others (goshawk and olive-sided flycatcher). Through time, a patchy distribution of deadfall, dead standing, and newly regenerating trees and shrubs would likely develop across the landscape. Some areas may continue to provide suitable habitat for those species requiring closed canopy forested areas and may even improve in quality as more coarse woody debris becomes available and the understory vegetation is released.

Overall, this alternative would result in the least amount of potential direct and indirect impacts to sensitive species and their habitat in both the short and long term.

Effects Common to both Action Alternatives

The effects of project activities upon sensitive species and their habitats are similar for both action alternatives. Those acres removed from harvest consideration under Alternative 3 are those acres identified to be of highest value to wildlife as determined by field surveys completed by the ID Team Wildlife Biologist and Wildlife Field Technicians. These surveys were completed during the 2010 and 2011 field seasons. The acres removed from harvest consideration involved areas containing the highest quality of Dense Horizontal Cover (lynx, marten, snowshoe hare..) and areas providing security and travel cover (elk, lynx..). Additionally, areas in which a road system does not currently exist were removed from harvest consideration (big game, lynx…). Removing these areas from harvest consideration would reduce the overall miles of temporary roads which would maintain habitat effectiveness on these acres.

The quantifiable differences between the alternatives is more of a function of the number of acres involved with each alternative with fewer acres harvested (Alternative 3) having less potential for impacting sensitive species or their habitat than alternatives with more acres to be treated (Alternative 2). To summarize, the overall potential impacts upon the nine species are addressed below.

Sensitive Amphibians (boreal toad and leopard frog)

There is a slight possibility that direct toad and frog mortality could occur during harvest operations although, given the current scope of the project (not operating in wet areas) and lack of both current and historic boreal toad and leopard frog documentation in the analysis area, this likelihood is low.

Removal of a substantial amount of overstory would change site conditions on the ground and could impact boreal toad and leopard frog survival and reproduction by changing the microclimate in the understory. Harvest would result in more openings and less woody debris on the forest floor. More openings impact toad habitat by increasing the risk of predation and decreasing surface moisture.

Sensitive Birds (Northern goshawk, boreal owl, olive-sided flycatcher)

The proposed project would result in fewer snags being available in the future for nesting and in less structure in the form of woody debris for these species and their prey species (boreal owl and goshawk), in particular red-backed voles for the boreal owl.

Removal of beetle infested trees would degrade habitat for small mammal prey species in the immediate project site and may make boreal owls, flycatchers and woodpeckers more vulnerable to predation by predators such as goshawk and great horned owls. However, the amount of debris retained on the ground, and the spatial distribution and concentration of trees remaining, should continue to provide suitable nesting and foraging habitat for these species within the area of influence. A decrease in snag habitat and potential for direct mortality, mainly upon nestlings, is possible for the olive-sided flycatcher from both the salvage logging and fuels reduction activities.

Logging activities could result in limited disturbance to these species during project implementation. Habitat effectiveness including ability to disperse across the landscape may be impacted slightly, but overall the area would continue to provide adequate habitat.

Sensitive Mammals (wolverine and American marten)

The proposed project is planned in areas primarily with an existing road system in place. Indirect effects include less woody debris available on the forest floor for wolverine and marten prey species, but this impact is not expected to be significant given the amount of debris that would remain. Removal of beetle infested trees in the project site would degrade prey habitat for these species in the immediate area. However, the spatial distribution and concentration of trees remaining would continue to provide suitable denning and foraging habitat for these species within the area of influence and project site.

Logging activities could result in limited disturbance to wolverine and marten if present during project implementation. Removal of these trees is not expected to impact movement of these species either within their home ranges or into other areas.

Sensitive Mammals (Bighorn Sheep)

The analysis area encompasses Bighorn Sheep Unit 53. Currently this population appears to be increasing and has a current estimated size of 110 animals. Bighorn are well documented in the southern half of the analysis area and are often observed along ridges in the House Canyon, Rio Grande Reservoir, Minnie Mountain, Lost Lakes, Long Canyon Ridge, Crooked Creek Ridge and Sawmill Canyon areas.

Project work is not occurring within Bighorn sheep habitat. There would be some potential for disturbance to bighorn caused by an increase in traffic by logging trucks, but this potential is very unlikely.

Determination for R2 Sensitive Species:

Alternative 1- No Action

This alternative allows natural processes to occur which may result in temporary conversion of habitat or even for habitat to become unsuitable for a period of time for some species. Overall, this alternative would result in the least amount of potential direct and indirect impacts upon sensitive species and their habitat in both the short and long term. It is determined that this Alternative would have **NO IMPACT** upon the nine species evaluated.

Alternatives 2 and 3 – Proposed and Limited Action

Alternatives 2 and 3 would both result in a given amount of habitat conversion depending upon the amount of acres involved with each alternative. ***Those acres removed from harvest consideration under Alternative 3 are those acres identified to be of highest value to wildlife as determined by the ID Team Wildlife Biologist and Wildlife Field Technicians***.

However, for this determination, the amount of acre conversion is not significant enough to warrant a different determination between the two action alternatives. It is determined that Alternatives 2 and 3, **MAY IMPACT INDIVIDUALS, but are not likely to cause a trend towards Federal listing or result in loss of viability in the planning area**.

Management indicator species (MIS)

MIS are addressed at the Forest Level due to the relatively limited habitat effects expected from either Action Alternative. Additional information for each species can be found in the project Wildlife Report and in the Forest's MIS Species Assessments (USDA Forest Service 2003).

There are nine MIS species for the Rio Grande National Forest. Of those species, four were dismissed from further evaluation due to lack of habitat in the analysis area or due to their habitat not being impacted by the project. Those species included Pygmy Nuthatch, Lincoln's Sparrow, Wilson's Sparrow and Vesper Sparrow. These species are briefly addressed in the Wildlife Report (Project File).

Five species were selected for further evaluation due to both their presence within the Black Mesa project area and/or potential impacts upon the habitat that they represent. These species include Brown Creeper, Hermit Thrush, Elk, Mule Deer and Rio Grande Cutthroat Trout (or their proxies). Table 3-10 is a summary of the effects of each alternative upon the MIS evaluated for this project.

Table 3-10. Summary of effects to Management Indicator Species, by alternative

SPECIES	Alternative 1 No Action	Alternative 2	Alternative 3
BIRDS	**Mature to late successional spruce/fir and mixed conifer**		
Brown Creeper To assist in monitoring whether Forest Plan standards and guidelines for biodiversity are being met, with an emphasis on snag	Snags for nesting and foraging will increase Some mature green trees will remain; however, some individuals may disperse into other habitat. No	Disturbance could occur from human activities on 9,410 acres displacing up to 1,182 pairs representing .015% of the Forests potential habitat. Some nest destruction could also occur. Sufficient snags will remain for nesting and foraging. Some mature green trees will remain; however, some	Disturbance could occur from human activities on 6,587 acres displacing up to 1,317 pairs representing .010% of the Forests potential habitat. Some nest destruction could also occur. Sufficient snags will remain for nesting and foraging. Some mature green trees will remain; however, some

management.	discernible effect on population persistence or viability at the Forest Level.	individuals may disperse into other habitat No discernible effect on population persistence or viability at the Forest Level.	individuals may disperse into other habitat, No discernible effect on population persistence or viability at the Forest Level.
Hermit Thrush To assist in monitoring whether Forest Plan standards and guidelines for biodiversity are being met, with an emphasis on coarse woody debris.	Sufficient coarse woody debris will remain. Small dense, green trees will remain. However, some individuals may disperse into other habitat. No discernible effect on population persistence or viability at the Forest Level.	Treatments may increase the rate of understory release on 9,410 acres. Short term disturbance may occur impacting up to 941 pairs representing .015% of the Forests potential habitat. Sufficient coarse woody debris will remain. Small dense, green trees will remain. However, some individuals may disperse into other habitat. No discernible effect on population persistence or viability at the Forest Level.	Treatments may increase the rate of understory release on 6,587 acres. Short term disturbance may occur impacting up to 658 pairs representing .010% of the Forests potential habitat. Sufficient coarse woody debris will remain. Small dense, green trees will remain. However, some individuals may disperse into other habitat. No discernible effect on population persistence or viability at the Forest Level.
MAMMALS			
Elk - To assist in monitoring whether Forest Plan standards and guidelines are being met for wildlife, with an emphasis on roads.	Decreases in canopy cover would result in more forage being available. However, some forage may become less available by the mid-term as more trees fall and large volumes of coarse woody debris accumulates on making movement difficult if not impossible in areas. No discernible change in population trends at the DAU level.	Activities associated with the proposed treatments would involve .009% of the DAU and .32% of the planning area. Activities would most likely result in temporary displacement or temporary changes in elk behavioral patterns. This displacement is expected to be short term with elk use returning to the same level or even greater level due to an increase in forage quality and quantity. Temporary road density increases. More disturbances due to more miles of roads utilized than Alternative 3.No discernible change in population trends at the DAU level.	Activities associated with the proposed treatments would involve .005% of the DAU and .28% of the planning area. Activities would most likely result in temporary displacement or temporary changes in elk behavioral patterns. This displacement is expected to be short term with elk use returning to the same level or even greater level due to an increase in forage quality and quantity. Minor increase in temporary road density; fewer disturbances due to fewer miles of roads utilized than Alternative 2. No discernible change in population trends at the DAU level
Mule Deer - To assist in monitoring whether Forest Plan standards and guidelines are being met with an emphasis on management issues that influence the early successional plant communities.	There would be no discernible change in population trends at the DAU level.	Activities associated with the proposed treatments would involve .009% of the DAU and .32% of the planning area. Temporary road density increases. More disturbances due to more miles of roads utilized than Alternative 3. No discernible change in population trends at the DAU level.	Activities associated with the proposed treatments would involve .005% of the DAU and .28% of the planning area. Minor increase in temporary road density. Fewer disturbances due to fewer miles of roads utilized than Alternative 2. No discernible change in population trends at the DAU level.
FISH			
Trout – To assist in monitoring whether Forest Plan standards and guidelines are being met with an emphasis on how project activities are conducted within the water influence zone to maintain stream health.	No discernible change in population persistence at the project or Forest Level.	No discernible change in population persistence at the project or Forest Level.	No discernible change in population persistence at the project or Forest Level.

Migratory birds

Neotropical migratory landbirds (NTMB) are birds that breed in the U.S. and winter in Mexico, Central and South America. Resident landbirds include those that remain during the winter period, or move to winter habitats that occur primarily within the U.S. border.

There are 37 Bird Conservation Regions (BCRs) in North America with four of these occurring at least partially in Colorado. The Rio Grande National Forest occurs within the Southern Rockies Colorado-Plateau Bird Conservation Region (BCR 16), Southern Rockies Physiographic Region 62. BCR 16 encompasses portions of Colorado, New Mexico, Arizona, Utah and Wyoming. Information from BCR 16 was synthesized for use in Colorado through the development of the Birds of Conservation Concern list (USDI Fish and Wildlife Service 2002) and the Colorado Landbird Conservation Plan (BCP).

Potential influences on migratory birds were tiered to conservation objectives at the Forest-Wide scale and BCR 16 (additional information on BCR 16 is available online at: http://www.nabci-us.org/bcrs.htmo). Table 3-11 lists Birds of Conservation Concern for BCR 16, their status within the project area, and projected influence from the Black Mesa project.

Table 3-11. FWS Birds of conservation concern for BCR 16 and anticipated influence of alternatives.

Species	General Habitat	Occurrence in Analysis Area	Effect of Alternatives
Northern Harrier	Grasslands	No	Evaluated as an R2 sensitive species; No Effect (No habitat present).
Swainson's Hawk	Grasslands	No	No Effect (No habitat present)
Ferruginous Hawk	Prairie	No	Evaluated as an R2 sensitive species; No Effect (No habitat present)
Golden Eagle	Cliffs/grasslands	No	No Effect; No known nests.
Peregrine Falcon	Cliffs	No	Evaluated as an R2 sensitive species; No Effect .
Prairie Falcon	Cliffs	No	No Effect. (No known nests near project areas).
Gunnison sage-grouse	Sagebrush	No	Evaluated as an R2 sensitive species; No Effect (No habitat).
Snowy Plover	Shorelines	No	No Effect (No habitat present)
Mountain Plover	Prairie	No	Evaluated as an R2 sensitive species; No Effect. (No habitat present).
Solitary Sandpiper	Shorelines	No	No Effect (No habitat present).
Marbled Godwit	Wetlands	No	No Effect (No habitat present).
Wilson's Phalarope	Waterbodies/ Shorelines	No	No Effect (No habitat present).
Yellow-billed Cuckoo	Deciduous Riparian	No	Evaluated as an R2 sensitive species; No Effect. (No habitat present).
Flammulated Owl	Ponderosa pine/snags	No	Evaluated as an R2 sensitive species; No Effect. (No habitat present)
Burrowing Owl	Plains/grasslands	No	Evaluated as an R2 sensitive species; No Effect. (No habitat

Table 3-11. FWS Birds of conservation concern for BCR 16 and anticipated influence of alternatives.			
Species	**General Habitat**	**Occurrence in Analysis Area**	**Effect of Alternatives**
			present)
Short-eared Owl	Parks/grasslands	No	No Effect. (No habitat present).
Black Swift	Waterfalls/wet cliffs	No	Evaluated as an R2 sensitive species; No Effect. (No habitat present)
Lewis's Woodpecker	Riparian Cottonwood	No	Evaluated as an R2 sensitive species; No Effect (No known occurrences.
Williamson's Sapsucker	**Montane forests/ snags**	**Possible**	**May Effect. Potential for direct mortality and disturbance.**
Gray Vireo	Oak woodlands/scrub	No	No Effect. (No habitat present).
Pinyon Jay	Pinyon/Juniper	No	No Effect. (No habitat present).
Bendire's Thrasher	Rare species of arid areas	No	No Effect. (No habitat present).
Crissal Thrasher	No records in CO.	No	No Effect. (No habitat present).
Sprague's pipit	No records in CO.	No	No Effect. (No habitat present).
Virginia's warbler	**Riparian shrub**	**Possible**	**No Effect. Species occurrence unlikely and no impact upon this habitat type.**
Black-throated gray warbler	Oak scrub/riparian	No	No Effect. (No habitat present).
Grace's warbler	Ponderosa pine	No	No Effect. (No habitat present).
Sage sparrow	Sagebrush	No	No Effect. (No habitat present).
Chestnut-collared longspur	Plains	No	No Effect. (No habitat present).

The Colorado Landbird Conservation Plan (Beidleman 2000) identified priority species and habitats for each physiographic area in the state, based on the Partners-In-Flight Species Prioritization Process. Priority habitats identified for the Southern Rocky Mountains Physiographic Area include: alpine tundra, aspen, cliff/rock, high elevation riparian, lowland riparian, mixed-conifer, mountain shrubland, ponderosa pine, sagebrush shrubland, spruce-fir, and wetlands. Table 3-12 shows the four habitat types that occur within the Black Mesa analysis area.

Table 3-12. Priority habitats and species of the Southern Rocky Mountains province and their relationship to assessment for the Black Mesa analysis area.				
Priority Habitat Type	**BCP Priority Species**	**BCP Potential Issues(s)**	**Potential Influence from Project Activities**	**Effect of Alternatives**
Aspen	Red-naped sapsucker Purple martin Violet-green swallow	Grazing, snag habitat, Altered disturbance regimes	Yes	Decrease in snags and potential for direct mortality.
High Elevation Riparian	Cordilleran flycatcher American dipper MacGillivray's warbler Wilson's warbler	Grazing, Recreation impacts	No major issues identified from the proposed project.	Minimal influences anticipated overall.
Mixed Conifer	Dusky grouse Williamson's sapsucker	Altered disturbance regimes, snags, timber mgmt.	Yes	Decrease in snags for sapsucker and potential for direct mortality.

Table 3-12. Priority habitats and species of the Southern Rocky Mountains province and their relationship to assessment for the Black Mesa analysis area.

Priority Habitat Type	BCP Priority Species	BCP Potential Issues(s)	Potential Influence from Project Activities	Effect of Alternatives
Spruce/ Fir	Boreal owl Olive-sided flycatcher Hammond's flycatcher	Timber mgmt., snags, altered disturbance regimes	Yes	Boreal Owl and Flycatcher evaluated as R2 Sensitive Species; May Impact Individuals. Hammonds flycatcher = decrease in snags and potential for direct mortality.

Summary of Effects of Alternatives on Migratory Birds:

There are no major issues identified to the High Elevation Riparian group as a result of the Black Mesa Project as most project activity does not occur in this habitat type and Project Design Criteria (chapter 2) would protect riparian areas. Forest Plan Standards and Guidelines are in place to further protect and provide guidance for migratory birds including Forest Plan Standard 21 – Consider the effects of proposed management activities (forest and rangeland management, prescribed and wildland fire use, recreation, etc.) on resident and migratory birds. Incorporate conservation measures and principles, as appropriate, from local bird conservation plans (NABCI) and/or other references into project designs so that adverse effects are minimized.

The Red-Naped sapsucker, Purple martin, Violet Green swallow, Dusky grouse, Williamson's sapsucker and Hammond's Sapsucker are species of migratory birds not already addressed in the Wildlife Report under another wildlife grouping. These species are typically found in aspen (Red-naped, purple martin and violet green swallow), mixed conifer (Dusky grouse and Williamson's sapsucker) and spruce fir (Hammond's flycatcher) habitat types.

A decrease in snag habitat and potential for direct mortality mainly upon nestlings is likely for these species from both the logging and fuels reduction activities. Project Design Criteria are in place to retain sufficient snags, reduce potential mortality by not implementing project activity until July 1st in which many nestling would have fledged, and to protect known active bird nests and cavities to reduce this potential threat. Activities associated with the projects - ***May Impact Individuals, but are not likely to cause a trend towards Federal listing or result in loss of viability in the planning area.***

These species will continue to be tracked in the Monitoring Colorado's Birds (MCB) Program, which includes transects on the Forest, to determine population trends over time.

General Wildlife

Table 3-13 below lists the wildlife observed in the analysis area during field survey conducted in 2010 and 2011 and table 3-14 summarized projected effect to wildlife categories by alternative.

Table 3-13. Wildlife documented during field surveys.		
REPTILES and AMPHIBIANS		
Tiger Salamander	Western Chorus Frog	Western Garter Snake
BIRDS		
American Robin	Gray Jay	Red Breasted Nuthatch
Black Headed Grosbeak	Hairy Woodpecker	Red Crossbill
Sharp Shined Hawk	Hermit Thrush (MIS)	Ruby Crowned Kinglet
Brown Creeper (MIS)	House Wren	Stellar Jay
Chipping Sparrow	Mountain Bluebird	Townsends Solitaire
Cooper's Hawk	Mountain Chickadee	Warbling Vireo
Dark Eyed Junco	Northern Flicker	Western Tanager
Downy Woodpecker	Northern 3-Toed Woodpecker	Red-tailed Hawk
Dusky Grouse	Orange Crowned Warbler	White Crowned Sparrow
Evening Grosbeak	Pine Grosbeak	Wilson's Warbler (MIS)
Golden Crowned Kinglet	Pine Siskin	Osprey
MAMMALS		
Black Bear	Moose	Southern Red-Backed Vole
Canada Lynx (threatened)	Mountain Lion	Red Squirrel
Bighorn Sheep (sensitive)	Mule Deer (MIS)	Snowshoe Hare
Elk (MIS)	Pine Marten	Chipmunk
	Porcupine	Pika

Table 3-14. Summary of effects to general wildlife, by alternative.			
Species observed	**Alternative 1**	**Alternative 2**	**Alternative 3**
Reptiles and Amphibians	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.
Birds	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.
Mammals	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.	Would not result in any noticeable change in habitat conditions or population trend.

In Summary: Selection of either action alternative would not result in any noticeable change in habitat conditions or population trends for General Wildlife. However, those acres removed from harvest consideration under Alternative 3 are those acres identified to be of highest value to wildlife, as determined by the ID Team Wildlife Biologist and Wildlife Field Technicians.

Cumulative Effects

Cumulatively, implementation of this project in relation to other future Federal, State or private land activities that are reasonably certain to occur would have minor incremental effects on Region 2 Designated Sensitive Species, Management Indicator Species, Migratory Birds and General Wildlife.

Relatively minor cumulative effects such as possible disturbance and/or displacement and loss of some individuals particularly nestlings, may impact individuals but would not likely contribute to a loss of species viability of any animal species addressed in this analysis. Implementation of project design criteria would help to alleviate some of these potential impacts.

3.7 Fisheries

Scope of the Analysis

The scope of this analysis discusses the fishery resources within the Black Mesa Project analysis area described in chapter 1.

Past Actions that have affected Existing Conditions

Previous activities in this analysis area are described in the Timber Management, Rangeland, Recreation and Watershed sections.

The most significant past action that has impacted fisheries, not only within the analysis area, but across the entire forest, is the stocking of non-native trout. The first documented nonnative trout stockings on the Forest occurred in 1891. Brook trout, brown trout, rainbow trout, and other cutthroat trout subspecies have been stocked in streams and lakes within the analysis area.

Existing Condition

Currently, the streams and riparian areas within the project area are generally in good condition and are meeting Forest Plan standards and guidelines. See chapter 3 Watershed section for detailed information on stream/riparian habitat condition and the Fisheries Biological Evaluation (located in the project record) for project evaluation on sensitive fish.

There are no self-sustaining native fish populations within the analysis area. There is suitable habitat throughout the analysis area that could support native trout, but self-sustaining nonnative fish populations are very well established in most of the perennial waters.

Black Mountain Lake supports a recreation population of Rio Grande cutthroat trout (RGCT) which is maintained by Colorado Parks and Wildlife hatchery stockings. The lake also supports a self-supporting population of brook trout which dominate the fishery. Three cutthroat trout were collected from Rio Grande Reservoir in 2010, but their exact lineage could not be verified. A single Rio Grande chub was also collected from Rio Grande Reservoir in 2010, but it is believed that the fish was introduced by anglers using chubs for bait. The reservoir is generally considered outside the historic range for Rio Grande chubs.

Most of the reservoirs are stocked with various nonnative trout species by Colorado Parks and Wildlife. Surveys conducted within the analysis area in the last 5 years failed to document any viable RGCT population other than the Black Mountain hatchery supported population.

Surveys in 2010 documented self-sustaining brook and brown trout populations in Crooked Creek, Long Canyon, and House Canyon. Surveys also documented rainbow trout in Crooked Creek, Long Canyon, South Clear Creek, and North Clear Creek. Colorado Parks and Wildlife

maintains a recreational fishery in Road Canyon Reservoir, Rio Grande Reservoir, Black Mountain Lake, Spring Creek Reservoir, and Regan Lake by stocking rainbow trout and/or brook trout. Splake (brook trout x lake trout) have also been stocked in Road Canyon Reservoir and Rio Grande Reservoir. Nonnative white suckers were also found in streams and reservoirs throughout the analysis area.

Although there are no self-sustaining native fish populations within the analysis area, the self-sustaining nonnative trout populations meet Forest Plan Desired Conditions for supporting viable populations of desired nonnative species. The well-established non-native trout populations also support the Regional and Forest Objectives for maintaining sport fish opportunities.

Direct, Indirect, and Cumulative Effects

Timber harvest proposed within the analysis area could have negative consequences on trout habitat if the actions result in changed rates of sediment and nutrient delivery, and altered levels of water temperature and dissolved oxygen. Timber harvest can impact the quantity, quality, and timing of runoff. Influences may include alterations to riparian communities, loss of in-stream and riparian cover, increase in sedimentation, loss of stream complexity, stream fragmentation, stream bank damage, loss of large woody debris recruitment, and changes in flow and temperature regimes. Roads associated with timber harvest can affect streams and fish habitat by directly accelerating erosion and sediment loading which can lead to changes in channel morphology, create movement barriers and change the runoff characteristics of watersheds. These effects can reduce spawning, rearing, foraging and over-winter habitat by increasing flows leading to bank instability and increased sedimentation.

The stocking of nonnative trout has had the most significant effect on the current distribution of native fish. Native trout readily hybridize with other spring spawning trout, including rainbow trout and nonnative subspecies of cutthroat trout, resulting in a loss of their genetic integrity and unique phenotypic characteristics. Native trout are also subject to competition and possibly predation by sympatric populations of brook trout and brown trout. Nonnative salmonids pose a serious threat to RGCT distribution although they do provide a valuable recreational fishery. The widespread stocking of trout has also led to the accidental introduction of nonnative white suckers, which are now found in many of the waters within the analysis area.

Increased sediment into streams from harvest activities and road construction/use can also provide suitable habitat for fish diseases and various disease vectors. Colorado Parks and Wildlife has an extensive outreach program informing anglers about aquatic nuisance species and diseases, which is aimed at reducing the spread of the species/diseases by outdoor users. Currently, whirling disease is not known from any of the streams within the project area.

Alternative 1 – No Action

No new surface disturbances from management activities would occur in any watersheds. Watersheds, stream channels, and riparian areas would be left in their existing condition. No pre-haul maintenance or road reconstruction would occur. Any road drainage problems would be left until they can be dealt with through normal maintenance operations.

The No Action Alternative proposes no management action, although some hazard trees may be removed to protect infrastructure and/or for human safety on an ongoing basis. Design criteria would be implemented to address hazard tree removal from water influence zones.

There would be No Effect on the trout or their habitat within the analysis area from management actions. Although, due to the scale of beetle activity and extensive tree mortality within the analysis area, the trout populations could still be affected by increases in erosion from heavy rainfall events and changes in seasonal stream flows. See chapter 3, Watershed, for additional discussion regarding beetle epidemics and potential effects to watershed hydrology.

Alternative 2 – Proposed Action

This alternative proposes the highest level of management activity with approximately 20% of the analysis area treated. Most salvage harvest activities, including new road construction, are on ridge tops and/or on slopes less than 40 percent and are well outside of the water influence zone (WIZ) of most streams and should therefore have very little direct effect on the fishery resources, or potential RGCT habitat, within the analysis area. There could be some indirect effects from sedimentation due to the increased volume of traffic on NFS roads and the use of approximately 40 miles of previously closed roads accessing the harvest areas. High use of these roads within WIZ areas could potentially increase sedimentation from road runoff if project design criteria are not strictly adhered with.

There could be some hazard tree removal within WIZ areas that should be closely coordinated with the forest hydrologist and/or fisheries biologist as stated in the Project Design Criteria (chapter 2). There could be instances where felling and leaving trees in riparian areas and/or streams could provide additional protection from high runoff or heavy riparian use and/or improve instream fish habitat. The fuel reduction treatments being proposed are well outside of the WIZ areas and should have no affect on the RGCT or their potential habitat.

Road work is included in both action alternatives and some surface disturbances would occur during pre-haul road maintenance, during old, non-system road reconstruction, and during construction of new roads. The short-term impacts that may occur during these activities would be offset by implementing PDC's and Forest Plan standards that are designed to improve/prevent road impacts to streams and correct existing drainage problems. Therefore, it is anticipated that as the roads are upgraded and drainage issues are resolved there would be some long-term benefits to the stream corridors, if the Project Design Criteria are fully implemented and adhered with.

Of the two action alternatives, this alternative will have the most potential to impact aquatic resources within the analysis area due to the overall scale of the project. Although, the impacts to overall stream health and trout populations should be minimal with implementation and full compliance with Forest Plan standards and guidelines, project design criteria, and Watershed Conservation Practices Handbook measures.

Alternative 3 – Limited Action

All activities described under Alternative 2 would occur under this alternative. The main difference between this alternative and Alternative 2 are that fewer acres and units are proposed for salvage harvest. Since fewer acres would be harvested, fewer acres would be needed for landings and fewer miles of system and non-system roads would be required. Impacts would be similar to those described for Alternative 2 with the same Standards, Guidelines, and project design criteria incorporated.

Most salvage harvest activities, including proposed new road temporary construction, are on ridge tops or on slopes less than 40 percent and are well outside the water influence zone (WIZ)

of most streams and should therefore have very little direct effect on the fishery resources, or potential RGCT habitat, within the analysis area. There could be some indirect effects from sedimentation due to the increased volume of traffic associated with the project on NFS roads and the use of approximately 20 miles of currently closed (gated) roads accessing the harvest areas, although if project design criteria are strictly adhered with these impacts should be minimal.

This alternative would cause less surface disturbance from tree harvest and road construction than Alternative 2 and would therefore pose less risk to aquatic resources. There are no sensitive fish species within the analysis area that would be impacted by any management activities and the impacts to stream health should be minimal with implementation and compliance with Forest Plan standards and guidelines, Project Design Criteria and Watershed Conservation Practices Handbook measures.

3.8 Rangeland

Scope of the Analysis

This section discusses rangeland resources within the analysis area as described in chapter 1. Specifically, effects analysis will focus on the active grazing allotments within the analysis area.

Past actions that have affected Existing Conditions

Previous activities in the analysis area include, but are not limited to logging and grazing by sheep and cattle. Past logging activities, particularly patch-cut areas, opened the over story, and some livestock grazing occurs where there is adequate forage production. The spruce-fir zone is not used in determining grazing capacity for a livestock grazing allotment.

Existing Condition

The northern portion of the analysis area boundary includes 22,641 acres of the 56,733 acre Park Cattle and Horse (C&H) allotment, and the southern portion contains 16,357 acres of the 16,517 acre Crooked Creek C&H allotment. The remainder of the analysis area lies within private land boundaries.

There are four term permit holders on the Park C & H allotment; authorized numbers total about 1,206 head of cattle with a potential grazing season of June 11 to October 10. The Crooked Creek allotment grazes approximately 275 cow/calf pairs from June 16 to September 30.

Capable rangeland occurs within meadows, along riparian areas, and in adjacent non-forested uplands. Some transitory range occurs in the Park and Crooked Creek allotments as a result of past harvest activities. Those forested areas within the spruce-fir zone are classified as incapable rangelands; minor acreages within the aspen zone may be included as capable rangelands. There are several water developments and fences in the area.

Direct, Indirect and Cumulative Effects

Alternative 1 – No Action

There would be no new activity proposed in the area. Forested areas that had been logged in the past would continue to regenerate with tree seedlings; forage production would be reduced

within these areas. Livestock use would become less on these sites and would increase on capable rangelands. There is a potential for increased available forage in timbered stands impacted by spruce beetle; dead and dying trees would create a more open canopy, though as trees fall over time, livestock movements may change or be limited in forested stands. Fence maintenance may be increased to account for falling trees. Any establishment of understory species would be dependent upon soil type, available water and nutrients, and needle cast. There are no cumulative impacts to the rangeland resource foreseen with this alternative, though some range improvements could be at risk of damage from falling dead trees.

Alternative 2 – Proposed Action

Proposed harvest and pile burning following thinning would occur within several pastures in both the Park and Crooked Creek allotments. Estimates of harvest acres by allotment are shown in the table 3-15. The pile burning acres would be less than the total acres thinned. The pile burning areas are mostly restricted to Wildland Urban Interface (WUI) along private boundaries to help with creating defensible zones. There are no plans for broadcast prescribed burns.

Table 3-15. Livestock allotments in analysis area and acres proposed for salvage, alternative 2.

Allotment	Pasture	Forested Acres Harvested Alternative 2
Crooked Creek	Crooked	401
	Long Canyon	149
	Reagan Lake	1323
	Road Canyon	45
	Sawmill	619
	South Clear Creek	123
	Stage Station	246
Park	Black Mountain	8560
	Brown Lakes	2239
	Mason Creek	1708
	South Upper Park	626
	West Minnie Mountain	1450
	West Upper Park	468

Harvesting dead and dying trees in the spruce/fir zone would reduce canopy cover and may provide for an increase in grass/forb cover. Livestock numbers would not increase; any additional forage would be considered temporary in nature as tree regeneration occurs.

To minimize livestock impacts in units proposed for regeneration planting, modification of grazing rotations or fence construction would be implemented, if needed. There would be no direct effects to most structural range improvements; any fences located in Units 3, 4, 6, 9 (Park Allotment) and a water development near Units 16 and 17 would be identified as protected improvements within the Sale Area. Hazard trees that may damage these structures would be cut and removed, as specified in Project Design Criteria (chapter 2). Indirectly, there may be a need for additional fences to facilitate effective livestock management as timbered stands, which may have served as physical deterrents to livestock, are opened up through harvest activities. Disturbance to livestock and related management activities due to harvest activities would be minimal and temporary. There is a potential for increased available forage in timbered stands impacted by spruce beetle; removal of dead and dying trees would create a more open canopy. Any establishment of understory species, and a resultant increase in forage would be dependent upon soil type, available water and nutrients, and needle cast. To minimize livestock

impacts to aspen regeneration, modification of grazing rotations or temporary fence construction would be implemented, if necessary.

Understory thinning with associated pile burning would occur on approximately 436 acres, mostly on the Park allotment, and some smaller areas on the Crooked Creek allotment along Wildland-Urban Interface (WUI) areas bounding private property to promote defensible space for wildland fire.

Alternative 3 – Limited Action

Effects of harvest treatments are identical to those mentioned under Alternative 2, but occurring on fewer acres. Proposed harvest with understory thinning and pile burning would occur on approximately 436 acres. Capable/suitable rangeland would be minimally affected. No further mitigations would be required except for monitoring effected areas.

3.9 Noxious Weeds

Direct, Indirect and Cumulative Effects

All Alternatives

Though no existing weed populations have been mapped in the project area, noxious weeds are a moderate concern among all alternatives. Recreation from vehicle use, camping, hiking, fishing and hunting are all potential sources of noxious weed spread. Additionally, heavy equipment during harvest activities travelling in and out of the harvest sites along with new temporary road disturbances may contribute to weed spread. Pile burning activities along WUI interfaces may have an effect because private property may contain weed sources that cannot be treated by Forest Service. Pile burning and thinning may produce temporary bare soil conditions in which habitat becomes suitable for weed establishment. Other sources of potential weeds would include rare introduction by seed mixtures during rehabilitation of road closures and other road work activities. Livestock and livestock transport are included as potential sources of weed introduction.

Project Design Criteria (and monitoring) would be used to minimize the potential for weed establishment by ensuring rapid revegetation of disturbed sites.

3.10 Threatened, Endangered, and Sensitive (TES) Plant Species

Scope of the Analysis

This analysis discusses plants that are Threatened, Endangered, Proposed, or Forest Service designated Sensitive. The analysis area for this discussion is defined by the areas proposed for management treatment under the action alternatives.

Past Actions that have affected Existing Conditions

Previous timber harvest activities are described in section 3.5 Forest Management. Other on-going activities are also described in other sections of chapter 3 under this heading.

Existing Condition

There are presently no reported records or suspected occurrences of T or E plants on this Forest. T and E plants in Colorado have unique habitats or ranges that do not occur on this Forest. There are also no plants Proposed for listing by the US Fish and Wildlife Service that occur on the Forest. Therefore, no further effects analysis was conducted.

None of the areas proposed for management treatment contain documented Sensitive plant species. There are five Sensitive plants suspected to have habitat in the areas proposed for treatment, based on habitat affinity (table 3-16).

Direct, Indirect, and Cumulative Effects

The analysis below is a summary from a Biological Assessment / Biological Evaluation (BA/BE) for plants that was prepared specifically for this project and is part of the project record. None of the alternatives would be expected to result in significant direct, indirect, or cumulative effects.

Alternative 1- No Action

This Alternative proposes no new management actions. There are no current or foreseeable future actions that would be expected to impact sensitive plants. Therefore, there would be no direct, indirect, or cumulative effect anticipated on any Sensitive plant species (table 3-16).

Alternatives 2 and 3 – Proposed and Limited Action

Since all action Alternatives propose some level of timber harvest, planting, road work, and prescribed fire treatments the effects are considered equivalent for this analysis since they affect the same habitat (i.e., there is no real distinction of effects between alternatives for this analysis area). Proposed actions would not impact any documented Sensitive plant populations. Potential habitat exists for five sensitive plants in the proposed treatment areas.

Four species were judged to be at such low risk from the proposed actions due to their habitats that there would be no direct, indirect, or cumulative effect. One species (assuming potential habitat is occupied) was judged to be directly, indirectly, or cumulatively affected (table 3-16). Direct effects could be from proposed actions clipping, crushing, or burning individual plants. Indirect effects could arise from changes in nearby canopy cover of associated vegetation due to direct effects. However, the effects of this are unknown. Most of the analysis area proposed for treatment has had past timber harvest activities.

Cumulative effects would be a very small, incremental increase in ground disturbance on potential Sensitive plant habitat affecting Federal lands. Implementing any action alternative would likely have a minimal impact on these plant species by following Project Design Criteria (chapter 2) along with Forest Plan standards and guidelines pertinent to ground-disturbing activities. Overall, cumulative effects tied to other past, present, and foreseeable activities in the analysis area would be expected to be minor.

Table 3-16. Sensitive plant species suspected in the treatment areas and effects determination by alternative.

Scientific name	Habitat Description	Determination[1] Alternative 1	Determination[1] Alternative 2 and 3
Eriophorum altaicum var. *neogaeum*	Peaty wetland >9,500 ft.	NI	NI
Eriophorum chamissonis	Peaty wetland 10,500 –12,500 ft.	NI	NI
Eriophorum gracile	Wetlands and pond edges 8,000 to 12,000 ft.	NI	NI
Machaeranthera coloradoensis	Gravelly grassland slopes 8,500 to 12,500 ft.	NI	MAII
Salix arizonica	Streamside meadows 10,300 to 10,700 ft.	NI	NI

[1] NI = No Impact;
MAII = May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide.

Physical Resources

This section includes the analysis of potential effects on physical resources. Many of the reports were summarized; complete reports are located in the project record.

3.11 Watershed

This section documents the analysis of potential project impacts to the water resource. Included is documentation of Project Design Criteria (chapter 2), and other mitigation measures implemented to ensure compliance with the Forest Plan for watershed protection, in addition to other pertinent regulations.

The following indicators were used to assess both the current conditions for the watershed resource and the potential effects of the proposed alternatives.

1. **Stream habitat indicators**: stream channel stability, Properly Functioning Condition (PFC) assessments, and water quality measurements;
2. **Road influence indicators**: road density, evidence of road erosion (sediment), condition of stream-road crossing structures;
3. **Water yield**: relative to historic stand conditions.

Scope of the Analysis

The analysis area and cumulative effects boundary for water resources consists of six 6th level HUC watersheds: Rio Grande Reservoir, Continental Reservoir-North Clear Creek, North Clear Creek, South Clear Creek, Spring Creek, and Texas Creek-Rio Grande. Watersheds and sub-watersheds described in this section are shown in appendix B, Map B-5.

Field observations were made of the road system to determine areas with the potential to deliver sediment to stream channels. Field observations were also made of proposed unit

boundaries and proximity to stream channels to assess the potential for sediment delivery from timber harvest activities. Any current sediment delivery to stream channels was also accounted for. In order to assess water quantity and yield, previous disturbance data (primarily timber harvests) was analyzed for each project watershed. Three sub-watersheds (HUC 7) with a high past disturbance level (10 to 15 percent of total watershed area) were identified as sub-watersheds of concern. These areas were then focused on during field surveys of response reaches to assess any changes in water yield.

Past Actions that have affected Existing Conditions

The project area has had a variety of ongoing activities for many years. As discussed elsewhere in this chapter, the majority of road systems were constructed or improved to implement timber sales in the 1970s and 1980s. Domestic livestock grazing has been ongoing since the late 1800s. Herds in the early 1900s were extensive (USDA For.Serv.1996, pg. A-28).

Existing Condition

The analysis area and cumulative effects boundary for water resources consists of the six 6th level HUC watersheds listed in table 3-17 and shown in Map B-5, appendix B. As shown in table 3-17, the majority of acreage in each watershed is publically owned.

Table 3-17. Landownership acreage, by watershed.

6th HUC Watershed	CO Parks & Wildlife	Forest Service	Private	Total
Continental Reservoir-North Clear Creek		31,422	710	32,209
North Clear Creek		10,182	605	10,963
Rio Grande Reservoir		15,156	237	15,398
South Clear Creek	529	13,409	1,056	14,994
Spring Creek		19,109	1,617	20,726
Texas Creek-Rio Grande		16,845	330	17,174
Total	**529**	**106,123**	**4,556**	**111,464**

Climate and Hydrology

Elevations within the watersheds range from approximately 9,006 to 12,258 feet. Rainfall, snow melt, and groundwater are the primary components of stream flow in the area. Mean annual precipitation in the project watersheds is approximately 21.6 inches. Snowmelt is the main source of rise and fall of the hydrograph in the spring and early summer. During other times of the year, stream flow decreases substantially and generally consists of released soil moisture and groundwater discharge. Several valley bottom springs were found to discharge into streams, a likely source of base flow during dry summer months.

Most precipitation falls in the form of snow from November through March and as rain in July through October. July and August are the warmest months of the year, December and January are the coldest. Weather patterns are also strongly influenced by the surrounding mountains. Summer thunderstorms from monsoons are common and can cause streams to rise quickly, but for relatively short periods.

Geology, Landform, and Soils

The soils in the project area are mainly volcanic in origin (basalt, tuff, breccia and hard volcanic rock) and are described in the Soils section.

The volcanic geology of the project area tends to have large fractures and drain relatively well. Where there is deep soil development and clay structure, water is held at the surface, but then drains readily into the subsurface geology. This deeply drained water tends to either recharge the aquifer or discharge at spring sources on valley bottoms. Because of this, there are numerous spring-fed streams that have spring sources along mountain bases. These types of landforms are not prone to development of large wetland complexes, except in areas where glaciers have deposited and compacted materials. Mapped wetlands based on the National Wetland Inventory definition (NWI Draft Report 2012) are shown on Map B-4, Appendix B. Most wetland-type areas are largely absent on the mountain slopes and found more often in valley bottoms. Project Design Criteria have been used to effectively protect smaller wetlands found in meadows adjacent to or within forested stands where harvest activities are proposed.

Because of the mostly "dry" surface in the project area, perennial streams are largely absent on mid-slope locations. Most perennial streams and springs occur at lower order locations, further down mountain slopes (see Map B-4, Appendix B). Most springs have been developed to provide water for livestock or other uses such as summer residences or for developed campground use. The overall drainage pattern is parallel with dendritic patterns at a finer scale. Streams and valley bottoms generally flow from southwest to the northeast and all drain into the Rio Grande River. Mountains show signs of past glaciations with their broad valley bottoms and have the appearance of large glacial moraines with predominate southwest to northeast orientation.

Seventh HUC Watersheds of Concern

The watershed analysis is focused on the 6th level watersheds. As shown in table 3-23, current watershed disturbance in the six- 6th level watersheds are below Forest Plan concern levels (<15 percent of a watershed in an equivalent roaded area). However, watersheds with known higher acreages of disturbance that could be masked were broken down to the 7th level sub-watershed to ensure watershed protection. If disturbance exceeds concern levels (>10% disturbance), watershed health is carefully evaluated to determine current condition. Management activities are not constrained beyond normal Forest Plan limitations, if stream and watershed health is good. However, if stream health has been reduced, the Forest evaluates the need to restore impacted areas and prevent new surface disturbance that could degrade stream health further.

In the analysis area, three 7th level HUCs were identified as being of concern due to past management-related disturbance. As can be seen in table 3-18, three sub-watersheds have disturbance levels over 10 percent but less than 15 percent. Therefore, these watersheds were the focus of concentration for field verification of stream conditions.

Table 3-18. Seventh HUC watersheds of concern, Black Mesa analysis area.

HUC6	HUC7 Number	HUC7 Name	Acres	% Watershed Disturbance
Continental Reservoir-North Clear Creek	13010001020106	Continental Reservoir	8,811	12.6

Table 3-18. Seventh HUC watersheds of concern, Black Mesa analysis area.				
HUC6	**HUC7 Number**	**HUC7 Name**	**Acres**	**% Watershed Disturbance**
South Clear Creek	13010001020108	Corral Creek	1,201	12.8
South Clear Creek	13010001020302	Mason Creek	2,854	11.7

Stream Channels

1. Perennial and Intermittent Channels

Table 3-19 displays total mapped stream miles by 6th level HUC, both inside the project area and for the entire watersheds. South Clear Creek and Spring Creek watersheds have the most stream miles within the project area. Texas Creek-Rio Grande has the least. These stream miles include sections that run through lakes. Perennial and intermittent streams with representations of Water Influence Zone 100 foot buffers on each side of streams are shown in appendix B, Map B-4.

Table 3-19. Stream miles inside and outside of analysis area, by type.						
	Total 6th HUC Stream Miles			**Project Area Stream Miles**		
6th HUC Watershed	**Intermittent**	**Perennial**	**Total**	**Intermittent**	**Perennial**	**Total**
Continental Reservoir-North Clear Creek	67.1	37.1	104.3	13.4	6.3	19.7
North Clear Creek	17.0	18.5	35.5	12.3	11.3	23.5
Rio Grande Reservoir	21.6	17.1	38.7	7.6	11.0	18.6
South Clear Creek	22.0	26.2	48.2	21.9	24.2	46.1
Spring Creek	26.8	33.2	60.0	23.8	28.5	52.4
Texas Creek-Rio Grande	28.0	21.8	49.7	1.4	5.5	7.0
Total	**182.5**	**153.9**	**336.4**	**80.4**	**86.9**	**167.3**

2. Properly Functioning Condition Stream Channels

Proper functioning condition (PFC) assessments (Prichard et. al, 1998) were done for 19 stream reaches in the project area watersheds.

These assessments were developed by the Bureau of Land Management and the USDA Forest Service to determine both the current state and function of a riparian zone and the direction zone is moving toward (trend). The assessment addresses 17 indicators under the functions of: hydrologic, vegetative, and soils-erosion deposition.

As can be seen from table 3-20, the stream segments within the HUC7 watersheds of concern were all rated as functional. In the PFC rating column, channels rated as Functional-At-Risk (FAR) are given a trend rating. The final seven PFC reaches were all surveyed in a separate effort in 2010 as part of a range allotment analysis. Figure 3-2, at right, shows locations of PFC reaches.

Complete checklists for PFC assessments can be found in the project record.

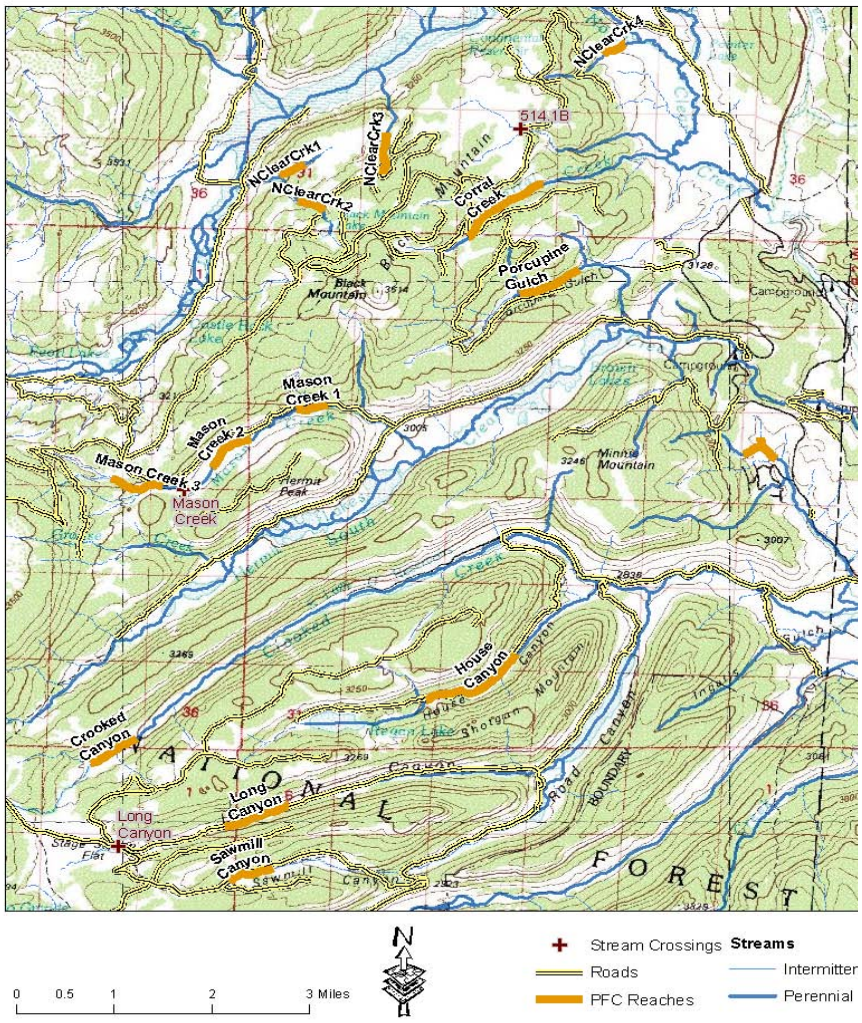


Figure 3-2. Proper Functioning Condition Reaches assessed.

Table 3-20. PFC reaches and ratings, Black Mesa project.

PFC Reach	PFC Rating	Length (mi)	HUC6	HUC7
Corral Creek	FAR-Not Apparent	1	North Clear Creek	Corral Creek
Mason Creek 1	PFC	0.3	South Clear Creek	Mason Creek
Mason Creek 2	FAR-Not Apparent	0.6	South Clear Creek	Mason Creek
Mason Creek 3	PFC	0.6	South Clear Creek	Mason Creek
Porcupine Gulch	PFC	0.7	South Clear Creek	
NFClearCrk1	PFC	0.3	Continental Reservoir-North Clear Creek	Continental Reservoir
NFClearCrk2	PFC	0.3	Continental Reservoir-North Clear Creek	Continental Reservoir
NFClearCrk3	PFC	0.5	Continental Reservoir-North Clear Creek	Continental Reservoir
NFClearCrk4	FAR-Not Apparent	0.2	North Clear Creek	

Table 3-20. PFC reaches and ratings, Black Mesa project.

PFC Reach	PFC Rating	Length (mi)	HUC6	HUC7
Spring Creek 1	PFC	0.1	Spring Creek	
Spring Creek 2	PFC	0.2	Spring Creek	
Spring Creek 3	PFC	0.1	Spring Creek	
House Canyon	PFC	1.6	Spring Creek	
Crooked CreekUp	FAR-downward	0.8	Spring Creek	
Crooked CreekDwn	PFC	2	Spring Creek	
Long CanyonDwn	PFC	2	Spring Creek	
Long CanyonUp	Nonfunctional	0.5	Spring Creek	
Sawmill/Road Canyon Dwn	PFC	0.5	Spring Creek	
Sawmill/Road Canyon Up	Nonfunctional	1	Spring Creek	

FAR=Functional At Risk, **PFC=**Properly Functioning Condition

3. Rosgen Channel Types

The Rosgen classification system is used for general stream characterization (Rosgen 1996). Streams in the Black Mesa project watersheds typically transition from A stream types in the higher elevations to B and E types in the lower reaches, with substrate dominated by cobble and finer material. Field review shows that the higher elevation A channels are predominately steep, without a floodplain, and mostly intermittent. These channels show stability and are resilient to management, both past and present.

4. Water Quality

There are no streams or lakes in the project area that are listed as impaired or threatened for water quality on the Colorado State 303d list. The Rio Grande from its source to North Fork Clear Creek is monitored for Iron but not listed as impaired. During stream surveys, water quality data was taken on PFC reaches. Water quality data includes pH, temperature, electrical conductance (EC), and macro-invertebrate counts. This data is considered baseline information to measure future changes and is located in Appendix D.

5. Stream Bank Condition

There were some signs of stream bank erosion in the surveyed stream reaches. This can be attributed in part to activities associated with livestock grazing. The areas surveyed are within active cattle allotments with grazing occurring during survey periods. No unstable stream banks were found from previous harvest activities or within proposed harvest units. Isolated sections of North Fork Clear Creek4, Long Canyon Down, Sawmill Up, and Crooked Canyon Up show signs of stream bank instability which may be linked to past grazing.

Stream Survey Summaries

Corral Creek HUC7 Watershed of Concern

The Corral Creek stream reach is a relatively flat (2 percent) E-channel with signs of cattle grazing and trailing throughout. The channel shows signs of vertical and horizontal stability with a high width to depth ratio in areas with cattle crossings. It has a wide, 200 foot floodplain covered with hummocks from cattle trampling and a thick cover of willows (Figure 3-3 (left)). This channel was rated as FAR without any apparent trend and shows signs of resiliency and stability. There are no apparent effects to this channel from potentially high past disturbance throughout the watershed. The photo shows a typical stream section with abundant willow and the channel dispersed underneath.

Mason Creek HUC7 Watershed of Concern

This is the lowest in elevation of the three Mason Creek reaches. Mason Creek 1 is an E channel with a PFC rating. This reach is an approximately 1,000 feet wide wetland type of valley bottom with sedge and grass dominated vegetation. Willows are largely absent in this stream reach. There were signs of livestock grazing throughout the riparian zone with some wide crossing locations. Brook trout were also observed throughout the stream. The channel was very well confined, with steep, stable side banks and no signs of vertical or horizontal instability. There are no signs of adverse effects to this stream from past disturbances in the watershed. Figure 3-3 (right) looks downstream from the bottom of the surveyed reach. Notice the bank stability, riffle-run section, and relatively fine textured stream bottom.

Figure 3-3. Typical stream sections on Corral Creek looking upstream (left) and Mason Creek 1 (right).

Mason Creek 2

The Mason Creek 2 reach begins approximately ½ mile upstream of the top of Mason Creek 1. This is a small channel with a small floodplain (about 1 foot x 1 foot). This channel shows evidence of heavy grazing in the past, but is now recovering. This stream has downcut previously but now is in the process of rebuilding a floodplain. It is now vertically and horizontally stable. There is grazing present, with a lack of stream side vegetation and crossing areas that are trampled. This steam has a wide (1000 feet) valley bottom composed of grasses and sedges with no willows present. Although there is evidence of some adverse effects from

past management, this stream is rated as FAR with an upward trend. There is no evidence that past disturbance in the larger watershed has caused negative effects to the stream reach. Figure 3-4 (left) looks downstream on the surveyed reach. Notice the small channel with sedges stabilizing the stream bank.

Mason Creek 3

The Mason Creek 3 stream reach starts approximately ½ mile upstream of the end of Mason Creek 2. This channel has a slightly steeper slope but still is classified as an E channel. This channel has a coarser substrate (boulders and cobbles) than the other Mason Creek channels. This reach also shows signs of past impairment from cattle grazing with some current crossings widened and trampled. This stream has some willow and a healthy grass/sedge mixture. The stream banks are stable and armored by the coarse substrate. Mason Creek 3 was also rated as Functional-At-Risk with an upward trend. There is no evidence that watershed-level disturbance is contributing negatively to this stream channel. Figure 3-4 (right) is a typical picture of Mason Creek 3 channel, pointing upstream.

Figure 3-4. Mason Creek 2 looking downstream (left); Mason Creek 3 upstream (right).

Continental Reservoir HUC7 Watersheds of Concern

North Fork Clear Creek 1

The North Fork Clear Creek 1 stream reach was the steepest channel surveyed (12 percent) and hence one of the A channels. This channel is in a confined, steep, and well-vegetated valley approximately 150 feet wide. Willow is the dominant vegetation type with some spruce/grass/sedge. This stream channel runs through dispersed wetlands. The valley shows signs of grazing with some impacted stream crossings. The substrate was boulder/gravel/silt dominated. The stream was rated as PFC and is very resilient. Figure 3-5 (left) shows how thickly vegetated the stream banks are. The channel is in the bottom right of this downstream picture.

Approximately 1000 feet above the uppermost end of North Fork Clear Creek 1 there is a large gully (3-4 feet deep) that goes through a meadow on a moderate slope (5 to 6 percent). It appears as though this gully may be the result of past grazing in the meadow. It is possible that this meadow had some perennial water historically. The gully is now stabilized, with vegetation

growing on the side slopes. There is no evidence that disturbances in the watershed as a whole have contributed to this gully. Figure 3-5 (right) is a picture of the gully looking upstream.

Figure 3-5. North Fork Clear Creek 1, downstream (left); Gully above North Fork Clear Creek 1 reach, upstream (right).

North Fork Clear Creek 2

The North Fork Clear Creek 2 stream channel is also a relatively steep (10%) A -channel. This channel is in a tight confined valley (20 to 30 feet wide) with willows throughout. There were signs of recent livestock grazing and some trampling at crossings, but overall riparian vegetation was vigorous and the stream channel is stable. The stream was rated as PFC. There is no evidence that watershed-wide disturbances are negatively affecting this stream.

North Fork Clear Creek 3

The North Fork Clear Creek 3 stream channel is a 4 percent B channel with a cobble/gravel substrate. This stream is in a wider valley (100 to 250 feet) dominated by willows. There is evidence of cattle trampling with hummocks and some crossing locations throughout. The stream is stable and was rated as PFC. There is no evidence that watershed-wide disturbances are negatively affecting this stream. Figure 3-6 at right is a typical stretch of this stream, looking downstream.

Figure 3-6. North Fork Clear Creek 3, downstream.

Special Considerations

There are no municipal watersheds in the project area. However, within the 6th Level HUC watersheds, there are several residences that have private wells.

Road Density

Table 3-21 shows acres, square miles, road miles, and road density for all 6th Level HUC watersheds in the project. All watersheds have moderately low road density.

Table 3-21. Acres and NFS road miles, and road density by watershed

Sixth HUC Watershed	Road Miles	Acres	Square Miles	Road Density (mi/mi^2)
Continental Reservoir-North Clear Creek	49.1	32,209	50.3	1.0
North Clear Creek	28.9	10,963	17.1	1.7
Rio Grande Reservoir	8.0	15,398	24.1	0.3
South Clear Creek	26.4	14,994	23.4	1.1
Spring Creek	41.1	20,726	32.4	1.3
Texas Creek-Rio Grande	4.1	17,174	26.8	0.2
Total	**157.6**	**111,464**	**174.2**	**0.9**

Heavily traveled roads have a higher erosion rate due to automobiles dislodging soil particles. During drier periods erosion would be caused by wind blowing dust; during rainstorms, erosion would be on the surface. Turbidity, therefore, increases at stream crossings during precipitation events when automotive travel is common (Kahklen 2001).

Field observations show that the road density in the project area is likely not having deleterious effects to either water yield or sediment inputs into streams. The road system was in very good shape, with very few signs of erosion and the majority of the road system is not open for public access. Additionally, road densities are relatively low.

Water Quantity/Yield

Any activity that alters the forest canopy has the potential to affect snow accumulation and ablation and subsequent stream runoff timing and magnitude (Grant et al. 2008). When stream flows are outside of normal ranges for long durations, stream morphology may be altered. Stream alterations arise when flows are higher than those in which a stream has evolved. This creates the potential for bank scour/erosion and subsequent increases in bedload deposition.

One of the confounding effects to water yield is the spruce beetle epidemic in the project area. Studies have shown increases in water yield following widespread infestations that have very high mortalities. A study by Potts (1974) on Jack Creek watershed on the Beaverhead-Deerlodge National forest in Southwestern Montana found that after mountain pine beetle (MPB) killed an estimated 35 percent of the timber in a 51.5 mi^2 drainage, there was a 15% increase in annual water yield, a 2 to 3 week hydrograph advance, 10 percent increase in low flows, and little increases in peak runoff. These results were all recorded in the 5 years following mortality.

A more recent study in western Colorado and southern Wyoming (Stednick, 2010) found no trends related to the proportion of watershed with MPB kill and changes in annual runoff and peak runoff in an analysis of 26 watersheds. Lukas and Gordon (2010) suggest that MPB killed stands act much differently than cleared stands and therefore may have different water yield effects. MPB killed stands do not have skid trials, roads, and other widespread soil

disturbances that intercept and concentrate water. In Colorado, they found that un-even age stands have little effects from MPB mortality as understory and suppressed trees and shrubs take up and intercept the excess water that the dead overstory was processing (Lukas and Gordon, 2010).

Spruce mortality in the project area has likely altered water yield somewhat, with small increase, but it is unlikely that this is measurable.

Stream-Road Crossings

There were three crossings found during field surveys that need to be addressed (figures 3-7, 3-8, 3-9)

The first crossing is on FSR 514.1B as it crosses an unnamed intermittent tributary to North Clear Creek. This crossing has a 48 inch culvert that is starting to fail and contributing sediment to the stream channel. The current culvert is not properly aligned with the stream channel, which could be an original cause of failure. This is not a major watershed issue as the crossing is over ½ mile upstream of a perennial channel and almost 2 miles upstream of North Fork Clear Creek. Photo on right is an upstream picture of the culvert.

Figure 3-7. 514.1B road looking upstream

A second culvert that needs addressed is on FSR 533 as it crosses Long Canyon. This crossing has a 36 inch culvert which has failed with all of the roadbed material being deposited into the stream channel. Bare soils in the fill and stream banks are still a direct sediment source. This crossing is on a perennial stream segment and therefore a higher watershed concern. The downstream scour pool shows that the original culvert was undersized and should be upgraded.

Figure 3-8. 514.1B road looking upstream (top); Long Canyon failed culvert on FSR 533 (bottom)

The third crossing in need of attention is on the Mason Creek crossing on the FSR 543 (Figure 3-9 at right). This is currently a low water crossing but would likely need to be upgraded with a temporary culvert with gravel aggregate hardened approaches prior to any timber hauling activities. This crossing has bare soil on either approach which is currently a watershed concern as it is a sediment source for a perennial stream.

Figure 3-9. Mason Creek – FSR 543 crossing.

Direct and Indirect Effects

The following issues will be analyzed to help understand and assess effects to the watershed resource:
How would the proposed project activities, in addition to past, present and future actions, affect stream channel stability and water quality, primarily sediment?
How would the proposed project activities, including past, present and future actions, affect water yield/water quantity including magnitude, timing, and duration of stream flows?
How would project activities affect seeps, springs, bogs, and other sensitive wet areas?

Alternative 1 − No Action

This alternative would maintain the watershed conditions as described in the existing conditions section. The current decline of the spruce-fir vegetation type would continue. Over time, this would increase downed woody material across the landscape and would likely have minimal effects to the hydrology resource. There is a minor potential for increased water yield following spruce beetle kill, as described above.

With this alternative, all existing conditions and trends would be maintained. This alternative partially fulfills regulatory and Forest Plan directions because some conditions are within standards, while others, specifically the stream-road crossings identified, need improvement. These stream crossings would be evaluated as part of the Forest Program of Work to determine the course of action needed to protect watershed values. Because this alternative does not initiate proposed actions, there are no monitoring or mitigation requirements.

Effects Common to All Alternatives 2 and 3

This section discloses the direct and indirect effects from the proposed actions. Cumulative effects are considered after the direct and indirect effects. A more detailed explanation of the proposal can be found in chapter 1.

Water Quantity/Yield

As mentioned in the current conditions section on water yield, the spruce beetle epidemic is likely already contributing minor increases in water yield, as the spruce die over a 1 to 3 year period after being infested. The research into these increases is mixed. It is unlikely they are measurable at this time. Field surveys did not find any indicators of negative stream effects from any increased water yield. The action alternatives only propose to treat dead and dying stands, so any potential increases in water yield would likely not be affected by removing dead and dying trees.

Studies of salvage harvesting of mountain pine beetle (MPB) killed stands in British Columbia show that MPB killed stands function somewhere between cleared stands and alive stands in terms of snow interception and ablation (Boon, 2007). MPB killed stands do not intercept as much snow fall as alive stands, but they intercept more than cleared stands. MPB killed stands have lower melting or vaporization rates than cleared stands and similar rates to live stands. Boon (2007) argues that the dead-standing stage is an important transitional stage that lasts 10 to 15 years, during which time stand recruitment likely acts to mitigate water yield effects.

Both action alternatives propose to plant acreage following salvage harvests. This, in addition to the abundance of regeneration under the dying stands leads to the conclusion that any water yield increases from the action alternatives is expected to be minimal and likely non-measurable.

Water Quality

Fine Sediment Delivery

The effects of timber harvests on sedimentation have been extensively documented. Tree removal operations using heavy machinery disturb the forest floor, removing protective ground cover, and can lead to concentrated overland flow of water which causes soil particles to be dislodged and hence erosion. Landings and skid trails are especially subject to erosion due to repeated passes and compaction. Erosion can be correlated with amount of exposed soil and surface disturbance. Generally, erosion rates are very low when the proportion of bare soil is less than 30 to 40 percent (Benevides-Solorio and MacDonald 2005).

It is not expected than any of the proposed treatments would create large enough of disturbance for erosion to be problematic across harvest units. Isolated areas of erosion would occur, especially on skid trails but Best Management Practices (BMPs) would keep soil from moving off site. Additionally, field investigations have confirmed that proposed harvest units are largely without perennial streams and standard ‘no harvest’ buffers would be applied to protect stream channels from potential sedimentation. Sediment delivery is unlikely to travel more than 300-feet, unless channelized (Belt et al. 1992).

Implementation of Forest Standards and Guidelines and design criteria from the R2 Watershed Conservation Practices Handbook would minimize potential sedimentation from harvest and associated activities.

The most likely source of any fine sediment delivered to stream channels is roads used for project implementation. Unpaved roads are one of the main sediment sources to streams in forested systems (USDA Forest Service 2000; Luce and Wemple 2001; and Sugden and Woods

2007). Road-related sediment delivered to streams can negatively affect water quality, habitat, sediment transport regimes, and channel morphology. Roads intercept surface and subsurface flow of water over hillslopes and concentrate it on road surfaces and down ditch lines (Luce and Wemple 2001). This may affect the hydrologic response of a watershed, including the timing and magnitude of the hydrograph. Wemple and Jones (2003) found that depending on the nature of storm events, watershed characteristics, and road segment attributes, storm flow response may be more rapid and have greater peaks because of the interaction roads have on hillslope flow.

Roads within 300-feet of stream channels and those crossing perennial streams have the most potential to deliver sediment to streams. The two perennial crossings mentioned in the current conditions section above are used for both alternatives and are the most likely to potentially produce stream sediment. These two crossings (FSRs 514.1B and 543) should be reviewed by watershed personnel before implementation. Other than the crossings above, there were no obvious areas of sediment delivery from streams found on any of the existing roads. Rio Grande National Forest standards and guidelines would minimize potential sedimentation from roads. Old roads that currently have recovered to some degree and have vegetative cover would be bladed and other maintenance issues addressed. Disconnecting any of this drainage from streams and routing drainage from roads through appropriate buffers is crucial to minimizing sedimentation potential.

Channel Stability and Stream Condition

All surveyed stream channels in the project area were found to be in stable condition. It is not expected that any of the proposed treatments in either action alternative would create any channel instability or stream bank erosion. Streams which were found to be Functional-At-Risk and Non-Functional were the result of past grazing activities and not timber harvests. Neither of the action alternatives has planned harvest or new road building in the Water Influence Zone (WIZ), so stream conditions would not be negatively affected.

Alternative 2 − Proposed Action

Roads

Alternative 2 has the most mileage of proposed haul routes and new road construction of the action alternatives. Table 3-22 below shows haul route mileage, by 6th HUC watershed. This includes up to 2.0 miles of system roads reconstruction, in the South Clear Creek watershed and 3.6 miles of new temporary roads, spread among four watersheds.

Table 3-22. Haul route mileage by watershed, alternative 2.

Haul Road Type	Continental Reservoir-North Clear Creek	North Clear Creek	Rio Grande Reservoir	South Clear Creek	Spring Creek	Texas Creek-Rio Grande	Total
Gated System	8.9	10.7	0.2	7.9	11.7		39.5
New System				2.0			2.0
New Temporary	0.6	0.6		1.1	1.3		3.6
Old Non-System	0.5			3.2	1.8		5.4
Open System Road	5.0			9.7	11.8	0.4	22.2
	15.0	**11.4**	**0.2**	**23.9**	**26.6**	**0.4**	**72.7**

The majority of the proposed haul routes were surveyed and found to be in good condition. All of the proposed new temporary roads were surveyed and found to be in stable landscape positions. Outside of localized disturbance, the new roads would not create any additional watershed issues.

Direct effects of not implementing the proposed action would primarily be potential for increased sedimentation from the crossings mentioned above

Vegetation Treatments

Table 3-23 below shows acreage of vegetation treatments, including salvage harvests and fuels treatments, by watershed. South Clear Creek watershed would have the most acres of treatments while Rio Grande Reservoir would have the least. The table also shows the watershed disturbance acres for the 6th level HUC watersheds prior to activities and post implementation disturbance for Alternative 2.

Table 3-23. Watershed disturbance by 6th HUC watershed, alternative 2.

6th HUC Watershed	Watershed Acres	Acres previous disturbance[1] Acres/Percent	Salvage Harvest	Fuels Treat-ments	Total Disturbance[2]
Continental Reservoir-North Clear Creek	32,209	1743 / 5.4%	1,903	129	1791 / 5.6%
North Clear Creek	10,963	590 / 5.4%	1,635	24	630.5 / 5.7%
Rio Grande Reservoir	15,398	1232 / 8%	104	0	1240 / 8%
South Clear Creek	14,994	947 / 6.3%	2,994	93	1089 / 7.2%
Spring Creek	20,726	1406 / 6.8%	2,644	138	1453 / 7.0%
Texas Creek-Rio Grande	17,174	212 / 1.2%	131	52	96 / 1.3%
Total	**111,464**		**9,410**	**436**	

[1]Includes 10% of previous timber harvests, existing road system (2.5 ac/mi or 5.0 ac/mile paved), water impoundments, 25% of private subdivisions and recreation areas; [2]Proposed salvage acres were considered as additional disturbance only if they occurred on different acres than previous harvests. New temporary roads were considered additional disturbance; old, non-system roads were counted in previous disturbance. Fuel treatments were not counted, since they would be done with chainsaws.

Most of the harvest units were field surveyed and found to be in stable locations with sufficient buffers around stream channels. It is unlikely that with standard BMPs there would be any watershed issues from the proposed harvests.

Seventh HUC Watersheds of Concern

Table 3-24, below shows the total post treatment disturbance for the 7th HUC Watersheds of Concern. The additional disturbance projected assumes that 10% of the proposed salvage treatment acres would be heavily disturbed by skid trails and other harvest activities. This is the disturbance percentage (10% of the total treatment acres) that is added to the current disturbance. The 15 percent level is not a Forest standard and guideline but a threshold level that signals a need for careful field investigations and concentrated analysis efforts to ensure that stream health has not been reduced.

Table 3-24. Post implementation disturbance levels for HUC7 Watersheds of concern, Alternative 2

7th HUC Watershed of Concern	Watershed Acres	Percent Current Watershed Disturbance	Proposed Treatment Acres	Percent Alternative 2 Disturbance	Total Percent Disturbance
Continental Reservoir	8,811	12.6	2,089	2.4	14.9
Corral Creek	1,201	12.8	616	5.1	17.9
Mason Creek	2,854	11.7	1,097	3.8	15.6

As mentioned in the current conditions section, response stream reaches examined in these watersheds were robust and do not currently show any negative effects from past logging disturbance. The treatments in Alternative 2 would not likely create any negative effects to these streams. Additional monitoring would occur in units of these watersheds to evaluate project design effectiveness.

In spite of the predicted increases in disturbance from the potential activities, it is not anticipated that these would cause any deleterious effects to stream channels or water quality in these watersheds. Field surveys verify that streams in these watersheds are robust and with standard mitigations, the proposed activities would not have negative effects to stream channels.

Alternative 3 − Limited Action

Roads

This alternative has less overall activities and hence disturbance than the proposed action. Alternative 3 has the least mileage of proposed haul routes and new temporary road construction. Table 3-25 below shows haul route mileage, by 6th HUC watershed. These include 0.9 miles of new temporary roads, spread among three watersheds and 11.8 miles of decommissioned road spread among five watersheds.

Table 3-25. Proposed haul route and decommissioned road mileage, by watershed, Alternative 3

Road Type	Continental Reservoir-North Clear Creek	North Clear Creek	Rio Grande Reservoir	South Clear Creek	Spring Creek	Texas Creek-Rio Grande	Total
Gated System	4.3	4.0		5.4	6.4		20.1
New Temporary	0.2			0.6	0.0		0.9
Old Non-System	0.5			2.7	1.1		4.5
Decommissioned System Road	2.7	3.8	0.2	0.8	4.3		11.8
Open System	4.9			8.3	11.8	0.4	25.4
Totals	**12.6**	**6.7**	**0.2**	**18.0**	**23.6**	**0.4**	**61.5**

The majority of the proposed haul routes were surveyed for conditions and found to be in very good condition. All of the proposed new temporary roads were surveyed and found to be in stable landscape positions. Outside of the localized disturbance, the new roads would not create any additional watershed issues. This alternative is the only action alternative that proposes to decommission system roads.

Road decommissioning activities can create an initial pulse of sediment into adjacent stream channels, but have been shown to decrease overall chronic sediment loads with time (Madej 2001; Switalski et al. 2004). It is assumed that within 3 years of road decommissioning, any sediment pulses would be eliminated and sediment loads would be below current levels. This applies only to roads within 300' of stream channels or stream crossings.

Vegetation Treatments

Table 3-26 below shows acreage of vegetation treatments, including salvage harvests and fuels treatments, by watershed. Spring Creek watershed has the most acreage of treatments while Rio Grande Reservoir has the least. The table also shows the watershed disturbance acres for the 6th level HUC watersheds prior to activities and post implementation disturbance for Alternative 3.

Table 3-26. Watershed disturbance by 6th HUC watershed, Alternative 3.

6th HUC Watershed	Watershed Acres	Acres previous disturbance[1] Acres/Percent	Salvage Harvest	Fuels Treat-ments	Total Disturbance[2]
Continental Reservoir-North Clear Creek	32,209	1743 / 5.4%	1,685	129	1789 / 5.5%
North Clear Creek	10,963	590 / 5.4%	842	24	604 / 5.5%
Rio Grande Reservoir	15,398	1232 / 8%	104	0	1240 / 8%
South Clear Creek	14,994	947 / 6.3%	1,744	93	1015 / 6.8%
Spring Creek	20,726	1406 / 6.8%	2,080	138	1445 / 7.0%
Texas Creek-Rio Grande	17,174	212 / 1.2%	131	52	96 / 1.3%
Total	**111,464**		**6,587**	**436**	

[1]Includes 10% of previous timber harvests, existing road system (2.5 ac/mi or 5.0 ac/mile paved), water impoundments, 25% of private subdivisions and recreation areas; [2]Proposed salvage acres were considered as additional disturbance only if they occurred on different acres than previous harvests. New temporary roads were considered additional disturbance; old, non-system roads were counted in previous disturbance. Fuel treatments were not counted, since they would be done with chainsaws.

Most of the harvest units were field surveyed and found to be in stable locations with sufficient buffers around stream channels. It is unlikely that with standard BMPs there will be any watershed issues from the proposed harvests.

Seventh HUC Watersheds of Concern

Table 3-27, below shows the total post treatment disturbance for the 7th HUC Watersheds of Concern for Alternative 3. The additional disturbance from Alternative 3 assumes that 10% of the proposed treatment acres (both salvage logging and fuels treatments) would be heavily disturbed by skid trails and other harvest activities. This is the disturbance percentage (10% of the total treatment acres) that is added to the current disturbance. The 15 percent watershed disturbance level is not a forest standard and guideline but a threshold level that signals a need for careful field investigations and concentrated analysis efforts to ensure that stream health has not been reduced.

Table 3-27. Disturbance levels for HUC 7 watershed of concern, Alternative 3.

7th HUC Watershed of Concern	Watershed Acres	Percent Current Watershed Disturbance	Limited Treatment Acres	Percent Alternative 3 Disturbance	Total Percent Disturbance
Continental Reservoir	8,811	12.6	1839	2.1	14.6
Corral Creek	1,201	12.8	483	4.0	16.8
Mason Creek	2,854	11.7	278	1.0	12.7

As mentioned in the existing condition section, response stream reaches examined in these watersheds were robust and do not currently show any negative effects from past disturbance. The treatments in Alternative 3 would not likely create any negative effects to these streams. As described in the PDC (Project Design Criteria, chapter 2), monitoring should occur in units in these watersheds for project design effectiveness.

It is not anticipated there would be any deleterious effects to stream channels or water quality in these watersheds due to project activities. Field surveys verify that streams in these watersheds are robust and with standard PDC, the proposed activities would not have negative effects to stream channels.

Cumulative Effects

Table 3-28 below summarizes the direct and indirect effects of the proposed project disturbances on a watershed analysis scale. When considering the potential for cumulative effects, the potential future activities and their impacts are given in table 3-29.

Table 3-28. Cumulative Effects checklist.

Effected Area	Indicator	Alternative 1	Alternative 2	Alternative 3
Aquatic Ecosystems	Physical: Sediment	No Effect	Minor Effect	Minor Effect
	Bed/bank stability	No Effect	Minor Effect	Minor Effect
	Flow regimes	No Effect	Minor Effect	Minor Effect
	Chemical: Temperature	No Effect	Minor Effect	Minor Effect
	Water Purity	No Effect	Minor Effect	Minor Effect
	Biological: Aquatic Life	No Effect	Minor Effect	Minor Effect
Special Areas	Riparian Ecosystems	No Effect	Minor Effect	Minor Effect
	Wetlands	No Effect	Minor Effect	Minor Effect
	Floodplains	No Effect	Minor Effect	Minor Effect
Cumulative Effects	Aquatic Ecosystems	No Effect	Minor Effect	Minor Effect
	Riparian Ecosystems	No Effect	Minor Effect	Minor Effect

Table 3-29. Potential cumulative effects of activities.	
Action	**Contribution and Possible Trend**
Natural Events	
Spruce beetle epidemic	Most likely would have some impact, although not likely to cause negative effects to water resources because the watersheds do not consist of 100% spruce stands.
Anthropogenic Events	
Timber harvest	Past harvest may have influenced water yield, but streams do not indicate impacts from excessive increases. Tree recruitment in streams creating habitat and dissipating energy has been reduced in areas where roads and timber removal occurred near streams. Future trends are for increased tree recruitment in water influence zones.
Road activities	In the past has negatively influenced water resources. Future trends are for upgrades and decommissioning that take watershed resources into account.
Private land development	Building near water resources, especially within riparian areas and floodplains has likely affected and continues to affect water quality through the localized removal of sediment filtering and shade producing vegetation, and increased runoff from impervious surfaces (buildings, paved roads, etc.). However, the watersheds are predominately public land so effects are localized.
Utilities	There are utility lines that run through the project area. The trees and brush that have encroached on the transmission line and any hazard trees that could reach the line would be cut to reduce the risk of fire and power outages.
Summer recreation	Would likely remain the same. Summer recreation is non-mechanized and not creating negative watershed impacts.
Firewood and other miscellaneous product gathering	Effects are not likely or minor and localized; firewood cutting in the WIZ likely occurs along roads and at dispersed camping areas.
Illegal ATV use	Negative impacts would be avoided largely through future enforcement. With the proximity to private land and treatments which open up the forest understory, there is the potential for increased future use.

Irreversible and Irretrievable Commitment of the Resources

Any minor impacts to watershed condition or stream health would heal with time. Successful implementation of standards and guidelines should keep aquatic resources healthy and prevent their irreversible or irretrievable loss; losses in structural capacities downstream would also be prevented.

3.12 Soils

Scope of Analysis

For soils, the treatment unit (i.e. boundary of harvest or burn unit) serves as the analysis area. Harvest or fuel treatment units or groups of units are therefore considered the activity area for which direct, indirect, and cumulative effects on soil productivity are analyzed. Temporary roads, skid roads, and landings within unit boundaries are included in the disturbance analysis. System roads are considered part of the Forest transportation system and are not considered for detrimental soil disturbance.

Soil productivity is a site-specific characteristic. Loss of soil productivity in a treatment unit alone does not lead to a loss in soil productivity in an adjacent stand or other areas across a watershed

The analysis areas for consideration of cumulative effects are the same as those evaluated for the existing condition and direct/indirect effects. Assessment of cumulative effects on soil productivity at scales larger than the specific treatment unit boundary (such as the watershed scale) misrepresents the effects of management activities by diluting the site-specific effects across a larger area.

The analysis standards address basic elements for the soils resource: (1) soil productivity (including soil loss, porosity, and organic matter), and (2) soil hydrologic function. The soil productivity direction identifies a value of 15 percent detrimental soil disturbance as a guideline for maintaining loss of soil productivity.

In August of 2011, units proposed for ground-based harvest were surveyed. Field soil quality assessments were performed by a professional journey-level soil scientist and trained soils crews. A modified version of the National Soil Condition Assessment protocols were used (Page-Dumroese et al. 2009). Field surveys consisted of random transects with confidence intervals at or above 80 percent +/- 5 percent and included examination of the following indicators:

Percent detrimental soil disturbance; defined as a decrease in soil porosity, or increase in soil bulk density, that impairs site productivity (Soil Disturbance Field Guide (Page-Dumroese et al. 2009).

- Percent cover by category; bare soil, rock, wood, vegetation, and litter.
- Down woody debris (tons per acre, greater than 3 inches size class).
- Litter and duff depths.
- Percent of rock in the uppermost soil horizon.
- Noted slope stability concerns and erosion and other soil concerns.

Past Actions that have affected Existing Conditions

Past activities in the project area are described in the Timber Management (section 3.5) and other sections in this chapter.

Existing Condition

Summary information for soils characteristics is located in appendix D.

Geology, Landtypes, Site Conditions, Soil Characteristics, Potentials, and Limitations to Management

The soils in the project area are generally volcanic (basalt, tuff, breccia and hard volcanic rock) in origin (Soil resource and ecological inventory 1996). These soils are loamy skeletal with some clay content. In the northern portion of the project area, clay makes up a larger percentage of the soil texture. Some of the areas have been glaciated and these materials tend to be unconsolidated materials that tend to display signs of compaction in their natural state. Glacial outwash and glacially scoured undifferentiated parent materials also exist. Most of the soils in the project area tend to be skeletal in nature (> 35 percent coarse fragments), thus somewhat rocky. Rocky outcrop areas are also present within the project area. Seeps are also commonly found in the Black Mountain or northern portion of the project area. The glacial till soils of the project area are generally moderately deep, well drained to extremely well-drained.
Because of parent material and past management, three soil properties are of concern within the project area:

(1) Soil organic matter in the form of CWD, litter and duff (soil productivity, nutrients);
(2) Soil porosity; and
(3) Erosion (Powers 1998).

Soil Organic Matter

Coarse Woody Debris (CWD) and Soil Wood-The majority of the units are in the spruce/fir forest type, so a minimum of10-15 tons/acre of large woody material is recommended (USDA Forest Serv, 1996; Graham et al. 2004). Based on a limited number of Brown's transects per unit, large woody material may be less than desired throughout the units due to past management treatments that removed both standing live and dead trees (recruitment) and downed trees. The *average* level of large woody material was estimated at 7 tons/acre.

Ground Cover and Forest Floor -Soil cover from organic matter averages about 98 percent across all units of the project. Approximately 2 percent is bare soil. This is indicative of soils which have a high capacity for nutrient cycling. Some of the organic matter, as well as associated nutrients are beginning to decompose and accumulate in the mineral portion of the soil as humus. In units 16, 17, 18, 20 and 22, bare soil is above 10 percent, and up to 15 percent. Litter depth and the depth of the duff layer averages 3 centimeters. The thin litter and duff is likely due to slow natural recovery (dry climate, low precipitation levels), and past management. Some units have almost no duff (litter layers mostly consisting of moss cover) likely due to past intense fires (indicated by scattered charcoal) and slow recovery of organic matter.

Soil Porosity

Soil porosity refers to the amount and character of void space within the soil. Rock content over 35 percent greatly reduces the effect of mechanical compaction. Generally, coarse fragments in the Black Mesa Project Area are greater than 35 percent, but range between 20 and 90 percent. Areas with coarse fragments less than 35 percent and with more ash content are more susceptible to compaction. Moisture is also an important factor in determining susceptibility to compaction, especially on finer textured soils. Dry soils are less likely to compact and have lower risk of compaction than moist soils (Welke and Fryles 2005). Even under moist conditions, coarse textured soils can compact.

Soil porosity is generally low on previously developed skid trails and landings in the northern portion of the project area. Detrimental soil compaction was found on existing skid trails in all of the treatment units. Although there were signs of recovery from compaction, levels were still considered detrimental. Areas in the northern portion of the project area, including units 1, 2, 3, 4, 5, 10, 12, 13, and 14 contain more clay and are much more susceptible to compaction and rutting than the soils in the southern portion of the project area

Low soil porosity is naturally common throughout some of the units because of parent material and past glaciation that compacted soils and created a natural hardness. Grazing disturbance, including compaction and erosion, was also found in the project area. Compaction from cattle grazing was generally concentrated near water sources, but detrimentally compacted livestock trails exist throughout these units.

Erosion

There were very few signs of active soil erosion in the units. There were some inclusions of units that had small soil creeps and landslides. There were also some areas with bare soil from road cutbanks that were actively eroding. Skid trail erosion was also found on steeper slopes where soil was barred (all soil cover eroded, bare soil exposed).

Overall Detrimental Soil Disturbance

The evaluation of detrimental soil disturbance looks at pieces of these soil functions in order to assess the existing soil condition and expected project effects. However, a single detrimental soil disturbance number does not tell the whole story; the data needs to be interpreted (Powers et al. 1998). The magnitude, duration, extent, type of disturbance, as well as the site resiliency and recovery potentials must be taken into account.

Field surveys of the proposed project activity areas indicate relatively high levels of detrimental soil disturbance. Only one treatment unit (unit 11) has slight disturbance between 0 and 5 percent. Twelve units (5, 6, 9, 10, 12, 13, 14, 15, 16, 19, 23, and 26) have moderate disturbance between 6 and 11 percent. Nine units have high disturbance between 12 and 14 percent (Units 2, 4, 7, 17, 18, 22, 24, and 25). Three remaining units exceed 15 percent detrimental soil disturbance (Units 1, 3 and 8). Observed detrimental disturbance is primarily from compaction on skid trails and landings in the northern portion of the project area and the loss of the A-horizon from erosion incurred from past harvesting and displacement along with the loss of organic matter from past harvesting and also perhaps past wildfire(s).

Direct and Indirect effects

In determining a change in productivity, a 15 percent reduction in inherent soil productivity potential was used as a basis for disturbance guidelines. This 15 percent reduction is generally considered a reduction of productivity over 15 percent of an area. Guidelines would apply to measurable or observable soil properties or conditions that are sensitive to change. These guideline values, along with aerial extent limits, serve as an early warning sign of reduced soil productive capacity, where changes to management practices or rehabilitation measures may be warranted.

The existing and estimated values for detrimental soil disturbance are not absolute and are best used to compare differences between alternatives. The calculation of the percent of additional detrimental disturbance from a given activity is an estimate, since detrimental disturbance is a combination of factors including existing groundcover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. The detrimental soil disturbance estimates assume that BMPs would be implemented and that soil recovery would occur over time.

Alternative 1 – No Action

Under the no action alternative, no additional management activities would take place and therefore no new soil disturbance would happen. The existing conditions were described above. Existing detrimental disturbance ranges from 2 to 20 percent. This occurs mainly on old skid trails and landings.

Based on a limited number of Brown's transects, average existing soil cover ranged from 85 to 100 percent and coarse woody debris was between 2 and 17 tons/acre with a weighted average of about 7 tons/acre. The current rate of tree mortality is expected to increase the levels of CWD to meet or exceed recommended levels in the future.

Without any additional management, the effects to soils would be no new disturbance except for grazing disturbance and a gradual recovery of the areas detrimentally disturbed with increasing CWD and ground cover buildup over time.

All Action Alternatives

Alternatives 2 and 3 would have both short and long-term effects on forest soil productivity. However, by implementing soils related Project Design Criteria (chapter 2) the project would meet the Region 2 Soil Quality Standards, and would therefore not have a significant impact to soils.

The categories that follow explain in more detail how each of the management activities would directly and indirectly affect the soil resource.

Ground-Based Harvesting - Effects could include: compaction; rutting and soil displacement; degradation of the litter layer and soil organic matter caused by increased decomposition rates and lack of appropriate annual litter contributions; and possible weed incursions

Effects of *past* logging methods can be detectable up to 80 or more years. Current logging systems create less soil disturbance, and although disturbance is still created, long-term soil productivity is not reduced. Under this project, proposed activities would use techniques that maintain or promote natural soil bio-physical resiliency. The effect of proposed activities would therefore be relatively short lived compared to past logging techniques. If all natural elements and processes remain intact, we can expect soil impacts to be nearly undetectable within 20 to 40 years based on professional judgment and experience on these soil types. Freeze-thaw cycles, soil organisms, and root growth would help alleviate compaction and rutting. Soil displacement may last longer, but Project Design Criteria would minimize soil displacement. Although effects last 20 to 40 years, long-term soil productivity would not be reduced over more than 15 percent of any unit.

Placing a high priority on reusing existing skid trails and landings would help to ensure that new detrimental disturbance would be minimized. It is assumed that main skid trails would disturb 10 percent of each unit by designating skid trails and controlling skid trail spacing. Some compaction would occur in areas outside of main skid trails where machinery makes one or two passes, but this increased compaction would not exceed threshold values as documented by Powers (2002). Units that contain soil map units with higher clay contents would be more susceptible to compaction. High rock contents would alleviate some compaction, but harvesting during dry or frozen conditions would be important to prevent rutting and compaction in these soil types which are located in all or portions of units: 1 through 11, 25 and 26.

Harvesting within proposed units is designed to avoid detrimental soil impacts on more than 15 percent of the activity area. Nine units currently have greater than 11 percent detrimental soil disturbance (2, 4, 7, 17, 18, 20, 22, 24 and 25) and three units (1, 3 and 8) have greater than 15 percent detrimental soil disturbance. Following the prescribed Project Design Criteria (chapter 2) for completing additional rehabilitation in units and areas listed, these units would not exceed their current levels of detrimental soil disturbance. Any soil disturbance would not be a substantial or permanent impairment.

Most research has found that detrimental soil compaction and displacement is associated with landings, temporary roads, and the main skid trails, especially near landings. Thinning operations were found to have the smallest amount of physical soil disturbance (Page-Dumroese et al. 2010). Harvest operations remove biomass and can remove site organic matter. On this project, landings would be rehabilitated and slash placed on skid trails to reduce erosion and reintroduce nutrients quickly in to the soil. Reforestation and leaving the

appropriate amount of coarse woody debris would replace organic matter displaced or lost during logging operations.

Fuel Reduction Treatments - Treatments proposed near private property include hand thinning smaller diameter understory trees, hand piling slash, and burning or shredding slash piles. Litter and duff consumption is likely to occur at high rates in localized areas if piles are burned. Small hand piles would minimize litter loss. If litter layers and organic matter are kept intact throughout the rest of the unit, nutrient losses would be minimal and localized from burning slash. There would be minimal to no significant changes in soil characteristics within the burned pile areas (Dyrness and Youngberg, 1957). Shredding would add to the litter and CWD.

Coarse Woody Debris (CWD)- CWD would experience some loss of function when the more decomposed logs are disturbed from heavy equipment use. However, increases in CWD from this project as residual trees fall through time would benefit long-term soil productivity**.**

Landings- Effects from landing construction could include soil compaction, litter loss, loss of coarse woody debris, increased potential for erosion, nutrient losses, loss of soil hydrologic and biologic function and possible weed incursions.

Log landings are generally 0.25 to 0.5 acres in size. Existing landings sometimes receive minor blading or small tree removal in order to prepare them for use. Sediment control measures would be used to avoid sediment movement from landing sites during maintenance and construction therefore resulting erosion would be minimal. As prescribed in the Project Design Criteria, some landings would be subsoiled and have CWD scattered on the surface. Landing subsoiling has been shown to be effective at reducing soil bulk density as long as soil moisture levels are not high (Kolka and Smidt 2004; Carr 1989; Kees 2008).

Road Maintenance- Proposed road maintenance and re-opening activities such as blading, drainage improvements, and surfacing on existing dedicated roads is proposed. These activities may increase short-term sediment movement from road surface runoff initially, but should be minimal, especially at road locations higher on the slope that are at a relatively low gradient and provide for sufficient buffer zones. This soil has lost most of its productivity already. Application of road maintenance BMPs would insure water quality and mitigate erosion potential.

Road Relocation (Alternative 2)- Portions of FSR 543 (needed to access unit 11) would need to be relocated in order to bypass an area that is currently too steep for logging trucks to navigate safely. The total length of road for relocation is estimated at up to 2 miles. Road construction creates detrimental soil disturbance. This would occur on approximately 1.5 acres in this unit; however, the old portion of FSR 543 would be fully decommissioned. See below under Road Decommissioning for a discussion of effects.

Temporary Road Construction - Road construction creates detrimental soil disturbance by bulldozing the surface layer aside and exposing non-productive subsoil layers. Temporary roads are typically 12 to14 feet wide. On flat to gentle slopes, where these roads are proposed, soil disturbance would be minimal to shallow cuts (0.5 to 2 feet). The fill material is deposited on top of the existing soil, thereby increasing soil depth which in turn increases soil water holding capacity. Soil organic materials are also incorporated into the soil. Increased water holding capacity and organic matter has a positive effect on site productivity. The increased soil productivity does not necessarily equal the soil productivity lost in the cut portion of the road.

The road surface is compacted by equipment travel during the construction process as well as from log truck travel on the road. Road soil compaction is a long-term effect. Following activities all temporary roads would be decommissioned (outsloped with slash placed on the surface or seeding) for hydrologic stability. Hydrological recovery is expected within the first 10 years with soil infiltration rates lower than natural forest rates (Luce 1997; Foltz and Maillard 2003). For the long term, infiltration rates improve over time as freeze/thaw and plant roots improve soil porosity, though rates would remain lower than adjacent natural forest soil (Switalski et al. 2004). Soil biological function would recover as forest floor and native plant communities return.

Road Decommissioning (Alternative 3) - Under alternative 3, following completion of project activities, approximately 11.8 miles of system roads would be decommissioned by removing culverts, installing waterbars, seeding, as needed, to stabilize the road surface and to close them to motorized use. The goal of road de-decommissioning is the restoration of site productivity and hydrologic function.

Reforestation - Any artificial reforestation work is anticipated to be done manually. This would not cause any additional ground disturbance. Reforestation would also encourage nutrient cycling, increase organic matter content, and decrease compaction.

Hazard Tree Removal -Under both alternatives, hazard tree removal is proposed within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins or other infrastructure. If this removal is done with ground based equipment, effects would be similar to those stated above under Ground Based Harvesting. If trees are hand felled, soil disturbance would be minimal.

Summary

The Black Mesa project would comply with the goals and standards of the R2 Soil Quality Standards Forest Plan, and the National Forest Management Act for restoring and maintaining long-term soil and land productivity. The management treatments proposed in each alternative would not adversely affect soil resources because site-specific design criteria would be implemented as part of each management alternative. These design criteria listed in chapter 2 would help to ensure that resource safeguards would be in place to prevent further adverse effects on soils. Where effects cannot be avoided, reclamation would occur to minimize or negate detrimental soil disturbance.

Cumulative Effects

Cumulative effects include a discussion of the combined, incremental effects of past, ongoing, and reasonably foreseeable activities. For activities to be considered cumulative, their effects need to overlap in both time and space with those of the proposed actions. For the soil resource, the area for consideration is the unit because effects on soils are site specific.

Project Implementation -The effects of project implementation are discussed above under direct and indirect effects. Alternative 1 would not add cumulative soil effects. No additional soil disturbance would occur because there would be no ground-based salvage harvest, fuel treatments, or road construction.

Harvesting activities including product removal would not overlap in time and space with past, ongoing, or foreseeable projects except where past disturbance has occurred. Existing soil conditions are discussed previously. The cumulative effects of project implementation would occur where equipment does not operate over existing skid trails causing new detrimental soil disturbance within a harvest unit. Fuel treatments or the burning of slash piles that occur

following harvest would also add to unit soil disturbance and cumulative effects where it does not overlap with prior disturbance.

Road Maintenance **-** Road maintenance would have no cumulative effect on soil resources since roads and road right-of-ways are a dedicated land use and considered part of the forest road infrastructure.

On roads that would be decommissioned, for the long term, infiltration rates may improve somewhat over time as freeze/thaw and plant roots improve soil porosity, though rates would likely remain lower than adjacent natural forest soil. The overall decommissioning of roads would benefit soil productivity from a larger watershed perspective.

Recreation **-**Disturbance from general motorized use and recreational access has been occurring and would continue throughout the project area indefinitely. No changes in the existing recreation profile are anticipated. Other recreational activities that occur off the developed roads, such as the gathering of miscellaneous forest products and hunting, are often carried out on foot, though vehicles are permitted up to 300 feet off of open NFS roads to gather firewood, camp or other recreational activities, these activities have minor localized effects on soils in the activity areas. In addition, any unauthorized off-road, motorized use would be discouraged as part of travel management enforcement efforts.

Noxious Weeds **-**Areas of disturbed soil provide an optimal location for weed establishment and subsequent invasion (DiTomaso 2000). Weeds establish quickly and can increase erosion, deplete soil moisture, and alter nutrient levels (DiTomaso 2000). Because the roots of noxious weeds are often deeper than native grasses, they also contribute less organic matter near the soil surface (Sperber et al. 2003).

Noxious weed monitoring and treatment would therefore occur as needed and would follow guidelines established in the San Juan-Rio Grande Weeds Environmental Assessment (USDA 1996). Effects to soil resources were analyzed in the document and its adaptive strategy. No additional effects to soils beyond what was analyzed for and disclosed in the EA are expected to occur.

Grazing -Almost all of the project area falls into an active allotment. These units are subject to cumulative grazing impacts. Impacts of grazing are limited to areas where animals bed, lounge, trail, or access water; they are generally small in aerial extent. Impacts include compaction, removal of groundcover, and soil displacement. Grazing will continue in the foreseeable future. Generally in this area compaction is limited to the grassland portions of the project area. The harvest units in which ground based equipment would be utilized are generally located in forested areas. There are effects of cattle in the grassland areas, but they generally do not overlap in space with the thinning treatment units.

Alternative 2-Proposed Action - Alternative 2 would have the largest effect on soil resources as measured by acres of detrimental soil disturbance, miles of new temporary road, and new landings. This alternative proposes to treat the largest amount of acres (9,410). Soil productivity changes would be expected to be greater than under Alternative 3 because of equipment disturbance to the forest floor on more acres. This disturbance is expected to be limited to skid trails, landings, and temporary roads. The activity areas would be expected to maintain forest ground cover across greater than 85 percent of the area and large wood, a combination of standing and down, would remain on site at levels specified by Graham *et al*. (1994).

Alternative 3 - Limited Action -Alternative 3 proposes to treat fewer acres than the proposed action (6,587) and ground based activities would be less. The type of disturbance in all units would be similar to that of alternative 2 with the exception of the units and parts of units not proposed for treatment. This disturbance would be expected to be limited to skid trails, landings, and temporary roads. The activity areas would be expected to maintain forest floor across greater than 85 percent of the area and large wood, a combination of standing and down, would remain on site at levels specified by Graham et al. (1994).

Table 3-30 shows the comparison of alternatives by soil disturbance.

Table 3-30. Comparison of alternatives by key soils effects.

Effects Indicator	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Action)
Acres Existing Detrimental Disturbance in all Harvest Units (current conditions) to be affected by harvest activities	0	1098	755
Total Acres detrimentally disturbed in units with >11% Detrimental Soil Disturbance (affected by Harvest)	0	640	410
Acres to receive restoration as per forest plan standard [a]	0	61	25

[a] Forest Standard require all units with > 14% detrimental disturbance to have enough acres of soil reclamation, so that unit is below 15% detrimental disturbance. The standard also states that units >11% disturbance will require reclamation so that the unit remains under the 15% limit. The acres above do not include the 12 to 14% detrimental disturbance level.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The planned actions adhere to the R2 Soil Quality Standards for maintaining soil productivity. To meet Region 2 Soil Quality Standards a unit must have less than 15 percent of its area in detrimental soil conditions or the cumulative effects from project implementation and rehabilitation should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality. If this threshold for change is reached, corrective actions are taken to restore or stabilize the impacted sites and move the unit towards a net improvement in soil quality.

The Black Mesa project actions would not create new detrimental soil conditions in excess of 15 percent in units that are currently below 15 percent detrimental soil disturbance and would move all units above 15 percent towards net improvement in soil quality. Therefore, the project would be consistent with Forestwide standards for site productivity (USDA Forest Service 1996).

3.13 Air Quality

Scope of the Analysis

Past Actions that have Affected Existing Condition

Current land ownership patterns, wilderness designations, relatively low population, and lack of industrial development have minimized the sources of sustained air pollutants. Pulses of

emissions that do occur are generally small, localized, and short-lived and therefore seldom overlap in time and space.

Legal Framework

The Clean Air Act, passed in 1970 and amended in 1977 and 1990, requires the Environmental Protection Agency (EPA) to set standards for air pollutants to protect the public health and welfare. The standards, known as National Ambient Air Quality Standards, limit the amount of these pollutants that can be present in the atmosphere. The EPA has set standards for six common pollutants known as "criteria" air pollutants—ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and carbon monoxide (CO). There are standards for two categories of particulate matter—one for suspended particles less than 10 micrometers in diameter (PM_{10}) and one for fine particles less than 2.5 micrometers in diameter ($PM_{2.5}$). Primary standards are designed to protect public health, while secondary standards are designed to protect public welfare. These standards can be found at: http://www.epa.gov/air/criteria.html

Unlike most other criteria pollutants, ozone is not emitted to the atmosphere directly; it is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. In general, ozone concentrations in the lower atmosphere are highest during warmer months and lower in the cooler months. In some parts of the western U.S., high winter-time ozone concentrations have been monitored. The project area is not in an airshed with monitored high winter-time ozone concentrations. The chemical reactions that form ozone are complicated and nonlinear, making it difficult to predict ozone concentrations that will result from increasing nitrogen oxides and volatile organic compounds in the atmosphere; effects depend on the ratio of the two precursors already present. Ozone formation is also highly dependent on meteorological conditions, including temperature, wind speed, and solar radiation. Ozone in the lower atmosphere is harmful to human health and vegetation. Some fine particulates ($PM_{2.5}$), particularly ammonium sulfate and ammonium nitrate particles, can also be formed in the atmosphere from the interaction of either SO_2 or nitrogen oxides or ammonium. These types of $PM_{2.5}$ particles are referred to as secondary particulates, while particles emitted directly from a source are referred to as primary particulates.

Fine particulate matter ($PM_{2.5}$) is chiefly comprised of five mass types: organic mass, elemental carbon (also known as soot or black carbon), ammonium sulfates, ammonium nitrates, and crustal materials (i.e., soil). Primary fine particulate emissions result from combustion processes (including fossil fuel combustion and biomass combustion that occurs in wild fires) and include black carbon. In general, however, black carbon and crustal materials comprise a relatively small proportion of the fine particulate mass suspended in the atmosphere.

Visibility is a measure of not only how far one can see, but how well one can see important characteristics of the landscape such as form, color, geologic features, and texture. Visibility is limited by the presence of particles and gasses in the atmosphere that scatter and absorb light. In the Clean Air Act, Congress established a national goal of remedying any existing, and preventing any future, impairment to visibility caused by manmade pollution in mandatory federal Class I areas (42 USC § 7491), including the Weminuche Wilderness Area.

In order to meet the goal set by Congress in the Clean Air Act of remedying existing manmade visibility impairment in mandatory federal Class I areas, the EPA promulgated the Regional Haze Rule in 1999. This rule requires states to develop plans to reduce manmade pollution in Class I areas. Visibility impairment is caused by small particles suspended in the atmosphere

that scatter or absorb light as it travels toward an observer. Visibility impairment affects not only how far one can see, but how well one can distinguish features of the landscape such as form, color, and texture. The Interagency Monitoring of Protected Visual Environments (IMPROVE) program has been established to monitor visibility conditions at Class I areas and provide information on the causes of visibility impairment and track progress toward meeting national visibility goals.

Existing Condition

Current conditions of air quality in Colorado are detailed in the Colorado Air Quality Control Commission: Report to the Public 2010-2011 (http://www.cdphe.state.co.us/ap/down/RTTP10-11Web.pdf). The project area is located in Colorado's Central Mountains Air Quality Region which includes many of the mountains and mountain valley areas of the state. Skiing, tourism, ranching, mining, and correctional facilities are the primary industries in this region. All of the area complies with federal air quality standards (Colorado Dept. of Public Health 2011).

Air quality in the area is generally good. Areas that meet federal ambient air quality standards are classified as being in attainment, while areas not meeting standards are classified as being in nonattainment. On April 30, 2012, the EPA finalized its ozone nonattainment designations with respect to the 2008 ozone standard[4] EPA identified only one nonattainment area in the Denver-Boulder-Greeley-Fort Collins metropolitan areas located along the Front Range approximately 150 miles to the northeast of the project area. EPA has not identified any current nonattainment areas in Colorado for any of the other criteria pollutants.

Colorado maintains a network of monitors that track compliance with ambient air quality standards. Most of the monitors are located in the eastern half of the state, particularly along the more urban Front Range. Southwestern Colorado, by comparison, is relatively sparsely populated, and there are no monitors in the immediate vicinity of the project area. There are, however, monitors in some areas of western Colorado. Table 3-30a shows the maximum monitored values by county for selected counties near the Rio Grande NF for the period 2009-2011. Not every county in the area has monitoring, and counties that do have monitors do not necessarily have monitoring for all criteria pollutants. No monitoring data were available for this period for SO_2 or lead concentrations for the selected counties. While these monitors cannot provide information regarding air quality in the immediate vicinity of the project area, they do give some insight into regional air quality conditions.

Table 3-30a. Monitored criterion pollutants in nearby counties, 2009 to 2011.

County	Year	CO 2nd Max 1-hr (ppm)	CO 2nd Max 8-hr (ppm)	NO_2 98th Percentile 1-hr (ppb)	Ozone 2nd Max 1-hr (ppm)	Ozone 4th Max 8-hr (ppm)	$PM_{2.5}$ 98th Percentile 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Weighted Mean 24-hr ($\mu g/m^3$)	PM_{10} 2nd Max 24-hr ($\mu g/m^3$)	PM_{10} Mean 24-hr ($\mu g/m^3$)
Archuleta	2009								78	23
	2010								65	21
	2011								81	21
Gunnison	2009								86	27
	2010				0.07	0.06			92	24
	2011				0.07	0.064			74	24
La Plata	2009	1.4	0.9	47	0.08	0.071	12	4.4	40	20

[4] (http://www.epa.gov/airquality/ozonepollution/designations/2008standards/final/region8f.htm).

Table 3-30a. Monitored criterion pollutants in nearby counties, 2009 to 2011.

County	Year	CO 2nd Max 1-hr (ppm)	CO 2nd Max 8-hr (ppm)	NO_2 98th Percentile 1-hr (ppb)	Ozone 2nd Max 1-hr (ppm)	Ozone 4th Max 8-hr (ppm)	$PM_{2.5}$ 98th Percentile 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Weighted Mean 24-hr ($\mu g/m^3$)	PM_{10} 2nd Max 24-hr ($\mu g/m^3$)	PM_{10} Mean 24-hr ($\mu g/m^3$)
	2010	1.2	0.7	39	0.08	0.074	11	4.3	88	21
	2011	1.3	0.7	38	0.08	**0.077**	12	4.5	50	18
San Miguel	2009								72	18
	2010				0.06	0.059			52	15
	2011				0.08	0.069			61	16

The table demonstrates that air quality in the vicinity of the project area is in compliance with the National Ambient Air Quality Standards. Only one exceedance of a standard is noted in the table, for ozone monitored in La Plata County in 2011. The monitor that recorded the exceedance was the Shamrock Mine monitor, located approximately 30 miles south southwest of the project area. The annual 4th-highest 8-hour ozone average for that year was 0.077 ppm. Since a violation of the standard only occurs when the three-year average of the annual 4th-highest daily maximum 8-hour is over 0.075 ppm, an individual exceedance does not necessarily indicate a violation of the standard.

Visibility is tracked using data from the IMPROVE monitoring system. The nearest IMPROVE monitor to the project area is located approximately 30 miles to the west on the south end of Engineer Mountain at an elevation of about 9,070 ft. Under the Regional Haze Rule, visibility is tracked on the clearest and haziest days. The clearest days are defined as the clearest 20% of days in each year, and the haziest days are defined as the haziest 20% of days in each year. Visibility impairment is measured in terms of a haze index called the deciview (dv). The deciview value increases as visibility impairment increases. The means of the haziest 20% and clearest 20% from the Weminuche IMPROVE monitoring site are plotted in figure 3-10. Data collected over the ten year period 2001-2010 indicate a statistically significant ($p<0.01$) improving trend on the clearest trends, and no trend on the haziest days.

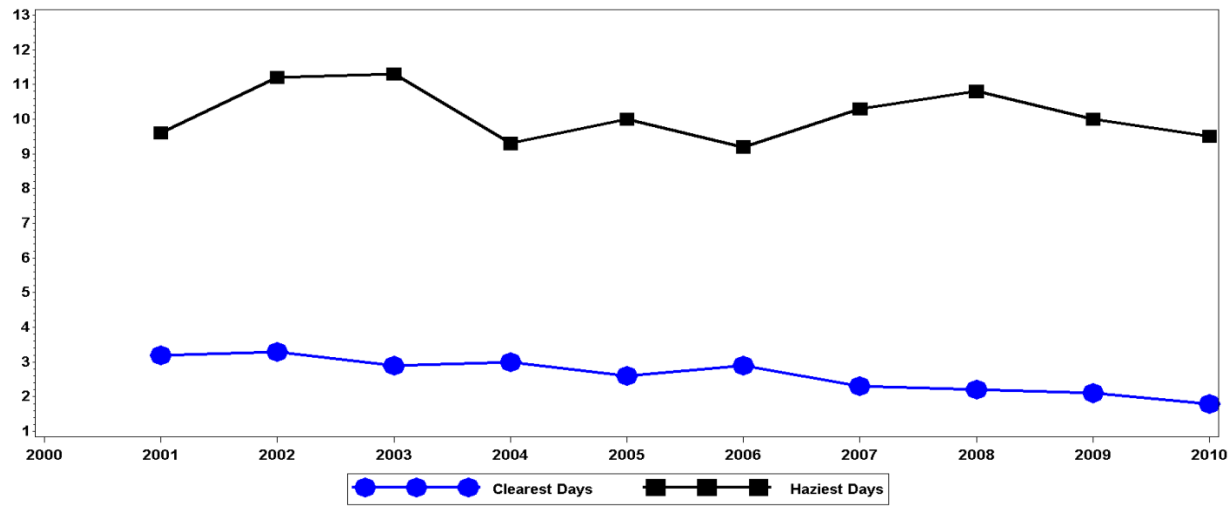


Figure 3-10. Annual mean Deciview on the clearest and haziest days at the Weminuche IMPROVE Visibility Monitor

Direct and Indirect Effects

Alternative 1 - No Action

No logging operations or pile burning would occur, so no additional emissions would occur.

Alternatives 2 and 3 – Proposed Action and Limited Action

Proposed project activities in the action alternatives that could directly affect air quality would include the combustion of fuel from equipment use in cutting, transporting, and hauling logs, burning slash piles at landings following harvest completion, and, if used, burning handpiles as part of WUI fuel reduction treatments.

Some road re-construction/maintenance would occur under both of the action alternatives. In general, this would result in emissions of fine particles (dust) from the disturbance to the ground surface and processing of road building materials, if needed, such as crushed rock, sand, and gravel, as well as volatile organic compounds, soot, nitrogen oxides, sulfur dioxide, particulates, carbon dioxide, and carbon monoxide from vehicle and construction equipment engines. Once road work is complete, vehicles travelling along the roads would emit, through their exhaust systems, volatile organic compounds, nitrogen oxides, sulfur dioxide, particulates, carbon dioxide, and carbon monoxide. Travel by vehicles along unpaved roads would result in additional emissions of fine particles from the surface of the roads.

Vehicle emissions from harvest operations would occur. Impacts from emissions would be short-term and localized, but would occur on an intermittent basis for several years. Vehicles used in harvesting operations and gas and diesel powered equipment used to cut and remove trees would result in emissions typically found in gas and diesel exhaust, including sulfur dioxide, particulates, volatile organic compounds, carbon dioxide, and nitrogen oxides. Depending on the season of logging (winter vs. summer), some amount of dust could be generated by harvest activities which could be more visible than vehicle emissions. If logging during summer months occurs, Project Design Criteria would require dust abatement on portions of FSR 520, which is the major recreation use road in the project area. Dust abatement would reduce the dust from all traffic during the period of use for that road.

The two action alternatives call for pile burning as a likely way to dispose of slash generated by both the WUI fuel treatments adjacent to private property and the large slash piles at landing areas. Pile burning usually occurs after the slash has cured for at least one season and is in the red-needled stage; piles are typically burned in the winter with adequate snow cover (minimum of 2 inches of continuous snow) to prevent the fire from spreading.

Pile burning would result in emissions typically associated with wood combustion, particularly volatile organic compounds, nitrogen oxides, soot, particulates, carbon dioxide, and carbon monoxide. Fires could also emit hazardous air pollutants, such as polynuclear aromatic hydrocarbons and aldehydes (such as formaldehyde). Since prescribed fires and slash burning are conducted under controlled conditions, are less intense than wildfires, and are much smaller in size, it can be reasonably expected that the emissions resulting from these fires would be considerably lower than those from an uncontrolled wildfire. All pile burning operations would also require smoke permits issued by the Colorado Air Pollution Control Division (CAPCD). Prescribed burn permits include specific parameters that must be met to limit short term air

quality impacts from smoke. Prescribed burns also require burn plans that consider smoke dispersal and impacts to local residences and visitors to the area to ensure that adverse effects are minimized.

The WUI fuel treatments could result in approximately 22 acres of handpiles (maximum size 8 ft. by 8 ft.) scattered across about 436 non-contiguous acres. The adjacent private homes are generally occupied only in the summer months, so the minor amounts of smoke generated would be unlikely to impact these residences. Logging activities would generate between 64 and 95 larger piles at landings, depending on the alternative. Burning of landing slash piles would likely occur at a rate of a few per season over several years, depending on the rate of harvest operations. The limited scale of winter burning operations would be unlikely to impact summer residences or the town of Creede.

Qualitatively, Alternative 3 would generate less vehicle emissions and dust, since fewer acres would be harvested and fewer slash piles would be burned, but neither alternative would be expected to have a measurable impact on local air quality.

Cumulative Effects

Emissions generated by implementing an action alternative would contribute somewhat to local pollution, but all affects would be short-term and limited. Due to the limited scale of potential logging operations and slash pile burning, the extent of impacts is expected to be quite small. Once project activities are completed in a particular area, any additional dust or smoke impacts would cease and have no further overlap in time or space with other pollution sources. As a result, proposed activities within the Black Mesa project area are not expected to contribute to any violation of National Ambient Air Quality standards or to contribute measurably to any increase in visibility impairment at nearby Class I areas.

All alternatives, therefore, would comply with the Clean Air Act. This conclusion is additionally supported by the Forest Plan FEIS (USDA Forest Service 1996a), pages 3-151 through 3-154 that air quality on the Forest is good for all air pollutants and all Forest Plan approved activities would meet National Ambient Air Quality Standards.

3.14 Fire and Fuels Management

Scope of Analysis

This analysis covers an area of approximately 46,046 acres in the Black Mountain, Finger Mesa, Hermit Peak, Minnie Mountain, Stage Station Flats, and the Rio Grande (FSR 520) recreation corridor area west of Creede, CO.

The processes used to conduct the technical analysis were the computer applications of the Forest Vegetation Simulator (FVS) with the Fire and Fuels Extension, Fuels Management Analyst Plus Ver. 3 (FMAPlus) and BehavePlus 5.0. In this analysis FVS was utilized to calculate snag fall and surface fuel accumulations over a 50 year time period. This simulated surface fuel loading was then compared to fuel loadings in the Photo Series Editor in FMAPlus to determine which fuel model would best represent these stands at the 1, 20, and 50 year time steps. BehavePlus was then utilized to model fire behavior and estimate rates of spread and flame lengths. The stand conditions used in FVS were modeled every 10 years out to the year

2063. A wildfire was simulated in 2013, 2033 and 2063 in separate simulations to compare potential fire behavior as stand conditions changed.

The Black Mesa project area would be generally categorized as Fire Regime V or infrequent fire occurrence (200+ years) and stand replacement in nature. The area is dominated by Engelmann spruce and subalpine fir on the higher slopes, ridges and valleys. Aspen (*Populus tremuloides*) is scattered throughout the area with some areas of extensive aspen stands that are likely the result of past fire disturbance. Figure 3-1, chapter 3, shows the dominant land cover types in the analysis area. Climate and weather conditions play a greater role in large fire development than fuel loading in this type of fire regime.

Fire Analysis

Fires in high elevation forests of the southern Rocky Mountains are infrequent and usually small, because the later snowmelt at these elevations and the frequent summer rain showers that generally keep these areas too wet to burn throughout most of the growing season. However, in rare dry years or under extended drought conditions, sufficient drying of the fuels may allow for large fires to burn across extensive portions of the landscape in severe, stand-replacement fires. These large stand replacing events lead to patches of forest types on the landscape that are uniform in their succession and stand characteristics (Romme, et. al. 2009)

When these spruce/fir stands burn as stand replacing fires, fire behavior is often of very high intensity[5] with flame lengths reaching two to three times the height of the existing canopy, exhibiting rapid rates of spread, and producing extensive fire brand/ember lofting ahead of the main fire. Large, down woody debris is often completely consumed and extensive soil heating can occur, which can affect many physical and chemical soil properties. Fire severity[6] and/or soil burn severity can be extensive in a stand replacing fire and determines how soon pioneer species recover within the area. In severely burned areas, soils may lose the ability to absorb moisture and exhibit water repellency for several years following the event.

Past fire suppression activities within the analysis area have been limited to small single tree fires or fires that seldom grew beyond 10 to 20 acres. This area has not seen extensive, landscape scale fires since the late 1800s/early 1900s. This fire pattern is well within the Historic Range of Variability (HRV) for this cover type.

Fuels Analysis

Past Actions that have affected Existing Conditions

Past harvest activities that have affected the fuel condition include 14 sales totaling approximately 14,000 acres in the Black Mesa analysis area going back to 1973. These sales removed the merchantable bole of the tree and left the tops, limbs, cull logs, and needles on site. In some sales, the landing piles of un-merchantable materials were burned following harvest. Because the decay rates of down, woody surface fuels is very slow at this elevation in a semi-arid climate, surface fuels have increased in some areas of these old harvest acres.

[5] **Fire intensity** - Energy output from the flaming front of the fire, does not take into account the smoldering combustion post fire frontal passage; closely correlated to flame length.

[6] **Fire severity**- Aboveground and belowground organic matter consumed by the fire. Soil burn severity- Amount of belowground organic matter consumed by the fire, a factor determined by soil temperature and duration of heating.

Background Information**-**The following information is summarized from the report titled *Review of Forest Service Response: The Bark Beetle Outbreak in Northern Colorado and Southern Wyoming* done by the Rocky Mountain Research Station and the Rocky Mountain Region at the request of Senator Mark Udall. The report was related to mountain pine beetle attacks in lodgepole and ponderosa pine, but the information regarding the changes in fire behavior, the various phases of beetle attack, and the effect of surface fuel accumulation are valid for spruce beetle attacked trees as well.

Bark beetle outbreaks can result in significant changes to forest stand structure and thus, to fire risks and fire behavior. Regardless of beetle activity, fire risk and behavior are shaped by the:
Amount, type and condition of vegetation, or fuels, on site,
Fuels' dryness and exposure to sun and wind, and
Local topography, elevation, and weather.

The presence of beetle activity adds additional variables to the challenges of predicting and managing fire risks based on:

- Species of beetle,
- Intensity and rate of tree mortality, and
- Time since the mortality.

Bark beetle mortality modifies the canopy fuels, surface fuels (grasses, forbs, shrubs, downed-woody material) and ground fuels (dead litter and humus). Localized weather conditions such as increased sun, wind, and rain or snow are also modified in proportion to the number of trees killed. These changes are directly linked to changes in the forest water balance which are known to affect fuel moisture relationships, and therefore fire behavior.

Intense scientific interest in bark beetle-fire interactions is relatively recent and is ongoing. It is clear that beetle infestations have a direct effect on wildfire potential, and that the degree of influence can be categorized by the phase of the infestation: attacked green, attacked yellow, standing dead red, standing/fallen dead grey, and fallen gray/new green.

Current understanding of effects of bark beetles on fire behavior: Basic fire science principles suggest that opening the forest should lead to drier surface fuels, more sunshine, and more wind which would favor increased ignitions and early fire spread resulting in more fires requiring management. Past experience is largely anecdotal, but decades of firefighter wisdom suggest fires will be more intense for an indeterminate amount of time following attack. Current operational fire behavior models were developed for "normal," healthy forests and does not include variables that address the phases of beetle attacks.

The physics and chemistry of fire and fire weather/climatology suggest all fire behavior measures should increase during the attack phases.
Following attack, forest composition and structure are fundamentally altered. Fire behavior can be expected to decline somewhat in the post attack phase and not return to pre-fire conditions. Conditions for surface fire spread are improved, whereas conditions for crown fire spread are reduced. However, snags present unique fire behavior problems, principally as a source for, and recipient of, embers which start new fires ahead of the main fire.
Snags constitute a major safety hazard for fire fighters. Safety concerns will reduce fire fighter effectiveness leading to larger fires.
Heavy downed logs slow fireline construction. The increased resistance to control implies fires will either grow larger or require more suppression resources.

Heavy downed logs are associated with extended burning, greater soil heating, sustained smoke production and extended fire mop-up, particularly in warmer-dryer forests.

Current crown fire prediction models are not valid in recently beetle-killed forests. The specifics of how beetle outbreaks affect the likelihood that a fire will start is poorly understood and a topic of current research. The increased presence of fine, dry surface fuels implies greater number of successful ignitions. The degree to which mortality affects fire potential depends on the stand structure prior to the bark beetle outbreak, and the level of stand mortality. Owing to the complexity of the number of sites, beetle outbreak dynamics, and scientific limitations, it is only possible to describe expected future fire potential in a general way. Management decisions should be based on local expert knowledge cognizant of the context for the decision.

Fire Severity and Soil Heating

Depending on the amount of soil heating, wildfires can have serious short-term implications for watershed protection. Severe wildfires not only destroy vegetation, but also can detrimentally burn soils. Soils are considered detrimentally burned when most woody debris, litter, duff, and humus are consumed down to bare mineral soil (USDA Forest Service 1992). Detrimentally burned soils reduce soil productivity and may result in gully formation, shallow slumping and decreased microbial activity. Soil heating, and thus fire severity, increases with every point in time as a result of fuel build up from dead trees falling to the ground.

The duration of soil heating is important because it affects the degree of change in soil properties. Heating of longer duration is more damaging than is heating of shorter duration. Longer heating destroys more organic matter and this affects many physical and chemical soil properties. Of particular importance is the effect of soil heating on nitrogen and soil microorganisms contained in the litter and soil.

Existing Condition

Based on stand exam data and Forest Vegetation Simulation modeling, surface fuel loadings varied extensively across the analysis area from stands with 25 tons/acre at the low end to stands with greater than 75 tons/acre at the high end. Due to the extensive spruce beetle mortality, these surface fuel loads are expected to increase over time. Snag fall-down rates for spruce beetle mortality have not been well documented, but Schmid & Hinds (1974) estimated an annual snag fall rate of 1.5 percent in spruce beetle killed Engelmann spruce. Meilke (1950) found that 84 percent of beetle killed spruce snags on the Dixie National Forest, in Utah were still standing after 25 years. A somewhat higher percentage of trees had dropped out of the smaller diameter classes than in the larger ones.

Structural Stage/Ecological Condition - Extensive spruce beetle mortality has affected the majority of the spruce above 4 inches in diameter within the analysis area. Subalpine fir is becoming the dominate conifer species within these stands. Areas with large aspen clones are reaching the end of their life-span and are slowly being encroached on by conifers. This has changed the nature of how fire would move through these stands.

Direct and Indirect Effects

Alternative 1- No Action

Alternative 1 proposes no additional management activities within the analysis area.

The short-term effects of the spruce beetle mortality will be an increased risk of crown fire initiation and spread while the dead trees retain the red or gray needles. This risk drops dramatically once the needles have fallen, usually within 1 to 3 years following infestation. Once the needles have fallen, there will be increased sunlight available to the forest floor which should lead to an increase in herbaceous plant growth. The increase in available fine fuel, plus the opening of the canopy, will allow for increased winds at ground level resulting in potentially higher rates of spread for surface fires. So while the risk of crown fires decreases, the rate of spread for surface fires will increase. Over time, as regeneration fills in, the potential for higher rates of spread would decrease.

Over the long term, as more of the dead trees fall, the surface fuel loading of large diameter material would increase. Due to the slow decay of the large diameter fuels in this environment, this material would continue to accumulate which would result in higher intensity fires of longer duration, if the area burns. These high intensity burns would increase soil heating to a deeper depth, detrimentally impacting soil micro-organisms and nutrient cycling.

As shown in table 3-31, the modeled projections for the no action alternative would produce the following tons per acre (T/A) of surface fuel loadings for 2013, 2033, and 2063.

Table 3-31. Modeled surface fuel loading (tons/ac), Alternative 1.

Year	Average > 3" Diameter Surface Fuel Loading
2013	36 T/A
2033	55 T/A
2063	48 T/A

The modeled fire behavior under the no action alternative indicates average flame lengths over 12 feet in length, rates of spread over 25 chains per hour and heat per unit area over 3000 BTUs per square foot across the majority of the project area throughout the 50 year timeframe.

Cumulative Effects

Because the current spruce beetle mortality is so extensive in the area, large areas of the spruce/fir forest have been affected. Dead spruce will continue to fall over time, which would add to the surface fuel loading, and increase fire intensity and soil burn severity. Subsequent regeneration (whether natural or by planting) would have a greater chance of being destroyed by wildfire due to the fire intensity and severity in areas of heavy surface fuel accumulations. Large areas of mortality are located in wilderness areas or in terrain inaccessible for salvage harvest (and fire suppression). These areas would be at risk for larger, high intensity/severity fires as the surface fuel accumulates over time. If a large fire started after substantial numbers of trees had begun to fall, resistance to control would be high.

Direct and Indirect Effects

Alternative 2- Proposed Action

Table 3-32, shows the modeled projections of fuel loadings for 2013, 2033, and 2063 would result in the following > 3" diameter surface fuels loadings following a simulated harvest in 2013. The column average >3 inches diameter fuel removed shows the difference in the amount of >3 inch diameter fuel removed by the proposed alternative compared to the no action alternative in tons per acre (T/A).

Table 3-32. Modeled surface fuel loading, tons/acre of material > 3 inches diameter, Alternative 2.

Year	Average surface fuel remaining	Average >3' fuel removed (as biomass)
2013	35 T/A	33 T/A
2033	33 T/A	--
2063	27 T/A	--

The modeled fire behavior under the proposed alternative indicates that in 2013 flame lengths, rates of spread, and heat per unit area remained very similar to the no action alternative. However, in 2033 and 2063 there is a significant decrease in heat per unit area (decreased from 3000 to 470 BTUs per square foot). Flame lengths also decrease from over 12 feet to less than 8 feet. In some cases the rates of spread stayed the same or actually increased due to increased sunlight in the stands and the increase in fine fuels/herbaceous growth. Wind speeds were also increased by opening up the stands.

Overall, harvested units show a decrease in >3" diameter fuels, flame lengths, and heat per unit area when compared to the no action alternative. In units that currently have an aspen component, the opening of the stand to increased sunlight and the disturbance of the logging activity could increase aspen sprouting and regeneration. Depending on the amount of aspen regeneration, fire behavior could be moderated in these areas.

The proposed alternative has the greatest effect in reducing potential flame lengths which correlates to decreased fire intensity and soil heating. In some of the units the potential rate of spread increases or stays the same due to the more open nature of the stands, which would allow for increased wind speeds at the surface.

The removal of small diameter ladder fuels and thinning from below adjacent to private property boundary would improve the defensibility of the private property and reduce the potential for crown fire initiation and spread in those areas. This thinning would be expected to generate a maximum of 40 slash piles per acre, each covering approximated 64 sq. ft. (8 ft. x 8 ft. footprint). The area impacted by winter slash pile burning would be approximately 2560 sq. ft/ acre or approximately 22 acres within the analysis area. Because these piles are very small in nature and the ground is typically frozen when the slash is burned, there is very little impact to the soil from these pile burns.

Alternative 3- Limited Action

Under the limited action alternative the modeled fire behavior would be similar to the proposed alternative in the harvested areas. Units not harvested would be the same as Alternative 1 with higher fuel loadings, flame lengths, and rates of spread. The effects of thinning along the private property would remain the same.

Cumulative Effects Alternatives 2 and 3

The proposed alternative would reduce large diameter surface fuel accumulation in the harvested units by removal of the dead standing trees. As the residual live trees and subsequent regeneration of Engelmann spruce mature, the fuel loading and potential fire behavior would continue to change. Spruce/fir stands at this elevation do not burn often due to moister weather conditions during most fire seasons. Long term drying conditions (drought) and favorable short term weather conditions (low Relative humidity's, higher temperatures, and increased winds) are usually required for these stands to burn. However, if these conditions are present the proposed alternative could reduce potential for high severity burns of long duration that could detrimentally affect soil micro-organisms and nutrient cycling in areas that have been harvested.

Summary of Cumulative Effects

The no action alternative would allow for greater surface fuel accumulation resulting from the extensive spruce beetle mortality. As the large diameter surface fuels accumulate the potential for more intense, longer duration fires and associated soil impacts also increase.

The two action alternatives would reduce the large diameter surface fuel accumulation in the harvested areas and lessen the potential risk of long duration, high intensity fires in the those areas. The changes in species composition, age classes, and structure stages would create a patchier mosaic of fuels across the analysis area, which should help to limit large fire spread and severity.

Social Resources _____

This section includes the analysis of potential effects on social resources. Many of the reports were summarized; complete reports are located in the project file.

3.15 Social-Economics

Scope of the Analysis

The social effects analysis primarily focuses on Hinsdale County and Mineral Counties, Colorado and to a minor extent, the San Luis Valley, Colorado. Communities nearest the project area include Creede, Lake City, and South Fork.

The economic analysis focuses on the financial efficiency associated with commercial timber harvest and fuels treatments within the Black Mesa project area. The purpose of this analysis is not to determine if the alternatives and associated projects are above or below cost, but to compare the financial efficiency of each alternative. This financial efficiency analysis does not incorporate monetary values for all known market and non-market benefits and costs, but focuses on quantifiable monetary costs and benefits associated with timber harvest and fuels treatment activities. The discussion, specific to the timber industry, focuses on the state of Colorado.

Assumptions were made in the financial analysis conducted using the software Quick-Silver (version 7.0) concerning the timing of commercial timber sales, volume offered in each sale, sale preparation time frames, as well as the size and timing of fuel treatments. These

assumptions may not be reflective of the final decision on how preliminary project units would be divided into final timber sales or fuel treatment projects, but rather provides a reasonable estimate of expected costs and benefits associated with each alternative, relative to each other. Costs and benefits associated with timber harvest activities and prescribed fuel treatments are provided in table 3-33.

Specific costs and benefits used in the Quick-Silver financial analysis were based on recently published bulletins, previous timber sales, specialist input, and recent experience.

Past Actions that have affected Existing Conditions

Hinsdale and Mineral Counties have documented human use dating back nearly 12,000 years. The presence of the Utes was documented by early European explorers in the 1800's (Lake City/Hinsdale County Marketing Committee, 2011; Creede & Mineral County Chamber of Commerce, 2011). Most Utes were moved from the San Luis Valley to the western side of the Continental Divide under a treaty ratified in 1869 between Chief Ouray and Kit Carson.

Resource use and tourism had early economic importance with both counties seeing an increase in Euro-American settlements during the 1870's and experienced mining booms between 1890 and 1900. Many of the early settlers used the surrounding lands for logging, mining, sheep and cattle grazing. Tourism in Mineral County area took early roots, when the Denver and Rio Grande Railroad opened a depot at Wagon Wheel Gap (Creede & Mineral County Chamber of Commerce 2011) in the late 1880s.

The first documented planned timber harvest activity in the analysis area recorded in the Forest Service activities database was a blowdown salvage that took place in 1973 on approximately 29 acres. Timber harvesting activity increased in the analysis area beginning in the late 1970's, and has continued to some level through the mid-2000s. The majority of roads in the analysis area were constructed for and financed by the sale of timber, as timber prices in the 1970's and 1980's were substantially higher than current-day prices. Refer to section 3.5, Forest Management for additional details on past timber harvests.

Existing Condition

Hinsdale and Mineral Counties have among the lowest populations and are among the least densely populated counties in Colorado. According to the U.S. Census Bureau (2011c, 2011d), the populations of Hinsdale and Mineral Counties in 2010 were 843 and 712, respectively. Because of their small populations and high percentages of land in federal ownership, these counties are currently heavily dependent upon revenues generated through tourism and recreational activities offered by the surrounding public lands including hunting, fishing, boating, snowmobiling, skiing, and birding. The combination of historical and scenic attractions and ample opportunities for outdoor recreation has made the recreational and tourism trades vital facets of the local economies. An average of 54.1 percent of employment is based on the travel and tourism trades in the counties, which is substantially higher than the 16.7 percent travel-tourism employment in Colorado as a whole (EPS-HDT, 2011a).

Because of the large percentage of federal land in these counties, National Forest lands are important sources of firewood, special forest products, and federal funding to the counties in lieu of property taxes. Livestock grazing has also remained an important component of the local economies. Many of the local ranchers graze cattle and sheep on Forest Service allotments in both counties.

Census data indicate that 9.2% of households in Hinsdale County (U.S. Census Bureau 2011a) and 28.4% of households in Mineral County utilize wood as home heating fuel (U.S. Census Bureau 2011b).

National Forest lands have also continued to be utilized for their hunting and fishing opportunities. These resource users contribute to local economy primarily during the summer and fall months and support the Colorado Division of Parks & Wildlife through license fees. Section 3.13, Recreation and Travel Management lists the number of special use permittees and others that utilize this area.

Timber harvesting and other vegetation management activities have been limited, but ongoing in the area. These activities have had mixed benefits to the local population; some timber sales have been purchased by local mills that generally utilize local contractors for logging operation, other sales have been purchased by mills from outside the local area, sometimes these mills contract with local contractors.

Following the 2008 economic downturn, one of Colorado's largest sawmills (Intermountain Resources, LLC, Montrose, CO), and frequent purchaser of timber sales on the Rio Grande National Forest, went into bank receivership and has not been able to bid on Forest Service timber sales resulting in several changes since that time: timber sales are starting to be scaled back in size, a higher number of sales have been awarded to local mills and purchasers (within the San Luis Valley), and timber prices have remained depressed. In late August 2012, the mill was purchased by Neiman Enterprises, Inc. of Hulett, Wyoming and has been renamed Montrose Forest Products LLC; this development may provide additional opportunities for product removal.

National Forest lands continue to be an important source of sawtimber for the timber industry in Colorado, especially for mills located within the San Luis Valley. Many of the commercial timber lands in the state of Colorado are in public ownership. There are roughly 265,000 acres on the Rio Grande National Forest designated for management with a timber production emphasis (Rio Grande NF GIS data). Across Colorado, approximately 988,000 acres of National Forest lands are designated by forest plans for timber emphasis. In comparison, the availability of private sawtimber is limited, approximately 3.4 million acres of state and private forest lands are considered capable of meeting commercial timberland status, but a large portion of the capable private timberlands in Colorado are not managed for timber production, or have been subdivided to the extent that commercial timber production is no longer feasible (Lynch and Mackes 2001).

Since National Forest lands make up a significant portion of the commercial timberlands in Colorado that are managed in part for wood production, federal timber plays a fundamental role in sustaining Colorado's timber industry. In 1999, 109.8 MMBF[7] of timber was harvested in Colorado. Of this, 51.5 MMBF (46.9%) of the harvest occurred on USFS lands (Lynch and Mackes 2001). Timber use in Colorado mills totaled 196,450 CCF[8] in 2005 (approximately 98.2 MMBF), taking into account wood provided to industry by both public and private sources (USDA Forest Service, 2006). During the period between 2003 and 2005, the Forest Service provided 52.4% of the 84,000 CCF milled annually at Intermountain Resources (USDA Forest Service, 2006). National Forest timber harvested in Colorado has declined over time from

[7] MMBF= million board feet of wood. Conversion from MMBF to CCF is approximately 0.5
[8] CCF = hundred cubic feet.

providing 80.3% of timber harvested in 1982, to 38.4 percent in 2002 (Morgan, Dillon, Keegan, Chase, & Thompson, 2006). Though National Forest timber does not provide as much timber to industry as it once did, it is still considered a vital supply to industry, as certain purchasers rely almost exclusively on National Forest timber to supply their processing facilities.

Direct and Indirect Effects

One financial analysis with three alternatives (Alternatives 1, 2, and 3) was run for the project. Table 3-33 summarizes the results from Quick-Silver.

Table 3-33. Quick-Silver financial analysis results.

Partner: All Partners

Alternative	PV- Benefits	PV- Costs	Benefit:Cost	Net Present Value	Approx. Vol. (CCF) Harvested	Approx. Fuels Rx. Acres
Alternative 1	$0	$250,000	0	-$250,000	0	0
Alternative 2	$939,161	$2,376,878	0.40	-$1,437,717	114,379	436
Alternative 3	$650,770	$1,744,246	0.37	-$1,093,476	76,981	436

Alternative 1 – No Action

The no action alternative would have various effects on the local population because the areas impacted by spruce beetle would not be treated. If left untreated, over time, these areas may become virtually inaccessible to many forest users due to the number of downed trees and could be unsafe to enter as trees began to fall.

A beneficial outcome of the no action alternative would be the abundance of firewood that could be made available to the public for years to come. In addition, the no action alternative would minimize short-term social conflicts between logging operations and recreational use. The travel and tourism trades may see a shift in user groups as access through the forest becomes more difficult as trees fall, but no detrimental effects would be expected.

Financially, this alternative has the highest (less negative) net present value (NPV) of the three alternatives, but has a benefit-to-cost ratio of zero because no commercial products would be sold. The no action alternative would have a negative impact on the timber industry in Colorado.

There have been numerous mill closures over the last 10 to 15 years in Colorado for a variety of reasons; one of those was reductions in the timber volume offered from National Forest lands. The Small Business Administration classifies most of the remaining sawmills in Colorado as small businesses with most of these located in rural communities with limited employment opportunities. The depressed timber economic market, in combination with high fuel costs, greatly limit processing facilities transport radius for raw material; based on recent experience with area timber sales, the material not offered under this alternative could have been utilized by mills located within the San Luis Valley.

Finally, this alternative would not allow for fuels reduction projects around the wildland-urban interface, thus leaving private property/structures within the analysis area at a higher risk for high intensity wildfire.

Cumulative Effects

Other areas of the District and Forest have been harvested in the past. These treatments have been part of a timber program that is oriented towards providing the wood products industry with a stable and sustainable supply of material, while at the same time, meeting other resource objectives. Under this alternative, the cumulative effects would be subtractive, and negative in nature. To be successful, industry needs a fairly stable supply of material. By not offering salvage material from the Black Mesa project, this supply stability in what the Rio Grande National Forest offers as part of its timber program may be disrupted in the long-term, negatively affecting the timber industry, dependent service providers, and the communities in which they reside.

In summary, this alternative would limit opportunities for local sawmills to benefit from local resources. The abundance of dead material would provide an ample source of fuelwood for local residents. Private property and structures within the analysis area would remain at a relatively high risk to high intensity wildfire, compared to the action alternatives. Spruce mortality may make access for forest users limited and potentially dangerous as trees begin to fall. Some forest users would likely still choose to use the area for various recreational opportunities, despite these changing and potentially hazardous forest conditions.

Direct and Indirect Effects

All Action Alternatives

Implementation of either action alternative would meet Forest Plan objectives for this project (See chapter 1) related to helping to diversify local and regional rural economies, especially on lands designated in the Forest Plan to emphasize forest product production.

Both Alternatives 2 and 3 would help the Forest meet these objectives and would have similar effects. Under these alternatives, between 76,981 CCF and 114,379 CCF, respectively, would be available to the timber industry. Providing this volume would allow mills and timber purchasers in the San Luis Valley to effectively compete and remain in business through this depressed timber market by providing raw material with relatively low mobilization and operational (hauling) costs.

Other beneficial impacts would include the increased safety and usability of the area after harvest is completed and reduced risk to infrastructure, compared to the No Action alternative. Opportunities to gather firewood along open roads would be reduced, but potential on gated roads may be increased following commercial timber harvest. Risk for high intensity wildfire would be reduced in areas surrounding private property and structures.

As experienced in the past, each of the action alternatives creates potential for some short-term conflict between timber harvest operations, private property owners, and other forest users. Some forest visitors may choose to use different areas which could negatively impact local businesses.

These action alternatives, in combination with changes that are occurring naturally on the landscape, may shift social uses that take place in the analysis area; this shift may bring new users into the area or direct current users to different location, but is not expected to detrimentally affect the travel and tourism trades that are vital to local economies.

Both action alternatives have a benefit-to-cost ratio less than one, indicating this analysis, and associated projects, are financially below cost to the Forest Service. Alternative 2 has a slightly higher benefit to cost ratio than Alternative 3; primarily due to more timber being sold, which spreads out the fixed cost of the analysis over a broader benefit. Both alternatives would reduce hazardous fuels along the wildland-urban interface. Each of the action alternatives would create a positive benefit to the economy by supporting forest product industries, contractors, and secondary support service providers.

Cumulative Effects

In response to the continuing spruce beetle epidemic, it is possible that additional salvage operations could be proposed in the counties, but no other large-scale projects are currently being planned so no additional potential conflicts between commercial and recreational uses of National Forest lands are expected.

In combination with past, present, and other planned harvest activities, either of the action alternatives would help the Forest Service to continue its stable and sustainable supply of timber. This in turn would help support the local and regional wood products industry, dependent service providers, and local economies.

In summary, the action alternatives have the potential to benefit the local communities and Colorado timber industry. In addition, forest conditions under a schedule of management can shape forest development and improve future recreational and commercial opportunities while increasing safety to forest users. Potential for conflict between Forest users exists for each of the action alternatives. Some forest users may choose to utilize alternative areas, which may negatively affect local businesses.

Environmental Justice

Executive Order 12898 directs Federal agencies to focus attention on human health and environmental conditions in minority and low income communities. The purpose of the executive order is to identify and address, as appropriate, disproportionately high adverse human health or environmental effects on minority and low income populations.

Table 3-34 summarizes population and household income data for the two counties. Based on the information available, neither county would be considered low income or a minority population as defined by Executive Order 12898 (CEQ 1997, Romero et al. 2001).

Table 3-34. Population information, Hinsdale and Mineral counties.

County	**Acres by Ownership[a]**		**Population Information**		**Median Household Income (2009)**	**% Below Poverty (2009 income)**
	Federal	**Private**				
Hindsdale	681,504	31,186	**Total**	**843**	$48,372	11.2%[b]
			%White	93.2		
			%Hispanic/ Latino	1.1		
			%American Indian	1.1		
			% Other Races	4.6		
Mineral	519,694	39,904	**Total**	**712**	$43,172	10.5%[c]
			%White	95.2		

Table 3-34. Population information, Hinsdale and Mineral counties.					
County	**Acres by Ownership[a]**	**Population Information**		**Median Household Income (2009)**	**% Below Poverty (2009 income)**
		%Hispanic/ Latino	2.9		
		% Other Races	1.9		
[a](EPS-HDT 2011b); [b](U.S. Census Bureau 2011c); [c](U.S. Census Bureau 2011d)					

Direct and Indirect Effects

Since county populations do not meet the definitions of low income or minority populations, there is no evidence to suggest that the proposed action or any of the alternatives would have a disproportionate adverse effect on low-income or minority populations.

3.16 Recreation and Travel Management

Scope of Analysis

This section addresses recreational and travel management within the Black Mesa Analysis Area as described in chapter 1. Figure 1-3, chapter 1 also shows the locations of the roads and road numbers.

Past Actions that have affected Existing Conditions

As described in other sections, past activities that affect the existing conditions include livestock grazing, timber harvest, road construction, and various forms of recreation, all occurring within the Black Mesa Analysis Area. Recent actions directly associated with recreation and travel management include significant work through use of American Recovery and Reinvestment Act (ARRA) and other funds to improve FSR 520.

Existing Condition

The Black Mesa project encompasses one of the Forest's highest recreation use areas. Almost all types of recreational activity occur in the area including: developed camping, dispersed camping, recreation residences, resorts, outfitting and guiding, river rafting, horseback riding, mountain biking, use of off highway vehicles or OHVs (includes ATVs, Side by Sides, Motorbikes), boating, rock climbing, sightseeing, four-wheel driving, hunting, firewood gathering, mushroom collecting, snowmobile travel along a groomed route as well as ungroomed areas and snowshoeing, as well as other recreational activities.

The bark beetle epidemic is impacting recreation by increasing the trees hazardous to infrastructure and increasing the need for work by Forest maintenance crews to remove trees before they cause damage. Falling trees are also causing additional road and trail maintenance to keep routes open.

Developed and Dispersed Recreation

Table 3-35 identifies the Forest developed recreation sites within the analysis area. The primary season of use is listed, but actual use varies with the weather, snowfall, and spring snowmelt. Peak season for all sites is considered the end of June through mid-August. Additionally, these

sites will receive high influxes for short durations (i.e. mid-September for aspen viewing, first rifle hunting season).

Table 3-35. Developed recreation sites within analysis area boundary (Infra Database), January 2012)

Type	Name	Description	Capacity	Primary Season of Use	Travel Corridor
Campground	Crooked Creek	4 sites, currently a non-fee site, very rustic, popular with groups, improved in 2010 utilizing ARRA funds. Restroom is located across FSR 520 from camping area	20	May thru October	FDR 520
	Road Canyon	6 sites, currently a non-fee site, recently improved through ARRA funds, new tables, fire rings, and graveled sites, old restroom,	30	May thru October	FDR 520
	River Hill	20 sites, 2 restrooms, concessionaire fee site, parking for day fishermen, improved in 2010 with ARRA funds	100	May thru Labor Day	FDR 520
	Thirty-Mile	35 sites, 3 restrooms, concessionaire fee site, parking for Thirty Mile Trailhead, improved in 2010 with ARRA funds	245	May thru October	FDR 520
Picnic Area	Road Canyon	Numerous picnic tables, restrooms, accessible fishing pier, boat ramp, improved in 2010 with ARRA funds	68	May thru October	FDR 520
	Rio Grande	Picnic table, signs, near Rio Grande Reservoir	21	May thru October	FDR 520
	Spring Creek Reservoir	Adjacent to Silver Thread Scenic Byway, restroom, 2 picnic tables, small fishing reservoir, scheduled for improvements in near future	24	May thru October	Hwy 149
Boating/ Fishing	Road Canyon	Pull out with restroom, access to Road Canyon Reservoir	14	Year Round	FDR 520
	Rio Grande Reservoir	Toilet, signing, boat ramp providing access to Rio Grande Reservoir	35	May thru October	FDR 520
Trailhead	Thirty Mile	Access to Squaw Creek Trail and Weminuche Creek Trail, parking is located within Thirty Mile Campground with trailhead adjacent to campground	100	May thru October	FDR 520
	Ute Creek	Access to Ute Creek Trail, restroom, highline, also receives heavy use from both day and overnight recreationists, provides parking for OHV users to access FDR 520	53	May thru October	FDR 520
State of Colorado sites					
Interpretive		Road Canyon – Waterfowl, multi-panel kiosk with small parking area		May thru October	FDR 520
Fishing		Browns Lake		Year +Round	FDR 515

Additional recreation sites are located outside the Black Mesa analysis area, but access to the sites is within the analysis area. These sites include:
Lost Trail campground
Rito-Hondo boating/fishing area
Trailheads: Lost Trail, Pole Creek, Starvation, Continental Divide National Scenic Trial, and Colorado Trail.

The analysis area also is used for a variety of dispersed recreational activities including camping, hiking, OHV riding, sightseeing, snowmobile riding, and snowshoeing. Dispersed camping along FSR 520 corridor is a primary activity and is heavily used by large groups in RVs (recreational vehicles). Also included in the FSR 520 corridor are two areas used to unload livestock and OHVs. Horseback riders use FSR 520 for about 0.8 miles to access the Thirty Mile Trailhead. The Ute Creek Trailhead is also used heavily by stock users, hikers and backpackers, OHVers, and RVers. Two other heavily used dispersed areas within the analysis area include Regan Lake (FSR 520 to FSR 521) and an area within the first mile of FSR 518. Like the sites along FSR 520 the peak season for these sites are from May through November, though Regan Lake can be a popular ice fishing site.

Recreation Special Uses

Recreation special uses offer additional opportunities for people to recreate on National Forest lands. Table 3-36 lists the authorizations with activities that occur either within or require travel through the analysis area.

Table 3-36 Recreation Special Uses within Black Mesa Analysis Area (Infra database, January 2012)

Type **Name**	**Description**	**Season of Use**	**Travel Corridor**
Resort Little Squaw	9 rental cabins and caretaker cabin, signs,	May thru October	FSR 520
Resort Thirty Mile	Recently returned to the Forest Service, decision on future authorization and activities pending	Historically May thru October	FSR 520
Outfitter Frazier Outfitters	Summer stock trips and fall big game hunts, alternative snow camp location on FSR 520, across road from Road Canyon Campground	May thru October	FSR 520
Outfitter Circle Divide Outfitters	Summer stock trips and fall big game hunts.	May thru November	FSR 520
Outfitter Schmittle Packing & Outfitting	Summer stock trips	June thru September	FSR 520
Outfitter Trail Skills	Summer stock trips, big game packing, historically based out of Lost Trail Ranch, sale of business pending with likelihood new owners will be traveling FSR 520 to access areas	May thru November	FSR 520
Outfitter Hartman	Big game hunting, travels to stock unloading area via 18 wheeler	August thru October	FSR 520
Outfitter Wilderness Ranch	Summer backpacking, trips beginning and ending at various locations through-out analysis area.	June thru September	FSR 520

Table 3-36 Recreation Special Uses within Black Mesa Analysis Area (Infra database, January 2012)			
Type Name	**Description**	**Season of Use**	**Travel Corridor**
Outfitter Colorado Trail Foundation	Summer backpacking trips	June thru September	FSR 520
Outfitter Colvig Silver Camp	Summer backpacking trips	June thru September	FSR 520
Outfitter Temporary Authorizations	Temporary authorizations may be issued any year for use within the Analysis Area and could include backpacking, hiking, mountain biking, cross country skiing, snowshoeing, snowcaving	Year round	FSR 520
Recreation Residence Rio Grande Summer Home Group (SHG)	15 cabins	May thru October	FSR 520
Recreation Residence Crooked Creek SHG	1 cabin	May thru October	FSR 520
Recreation Residence Rock Springs SHG	3 cabins	May thru October	FSR 520
Snow Play (Club) Lake City Snowmobile Club	Route begins at the parking lot just off Hwy 149 going into Continental Ranch/Rito Hondo area. During the winter this route follows FDR 513 which is also the Analysis Area boundary.	November thru April	FSR 513

Travel Management

Forest System Roads (FSRs) open to the motorized recreating public within the analysis area are described in section 3.14 Transportation System. All FSRs except FSR 519 in the project area are also open to OHV's. No system trails are located within the analysis area.

Travel management on the Forest limits motorized travel to designated roads and motorized trails. OHV's are allowed on FSRs. The Forest also has a Game Retrieval Policy which allows the use of ATV's less than 50 inches to travel off system roads and trails in the afternoon hours, outside of areas designated as Backcountry (MAP 3.3), to retrieve downed game.

In the winter FSR 513 is groomed and open to travel by over the snow vehicles (primarily snowmobiles). FSR 513 is on the boundary of the analysis area but would not be utilized for any logging or hauling and therefore activities should not impact its use in winter.

Wilderness Areas

There is no Wilderness or Wilderness Study Areas within the analysis area

Roadless Areas and Research Natural Areas

The Black Mesa analysis area includes acreages from both the Box/Road Canyon and Pole/Finger Mesa Inventoried Roadless Areas (IRA's). No salvage harvest is proposed within any of these areas; limited WUI fuel treatments are proposed within 400 feet of private land; all proposed actions are consistent with current direction Forest Plan direction for. Proposed WUI fuel treatments would maintain the current roadless status, while minimizing disturbance to soil, air, plant, and wildlife communities. The proposed treatments would have little effect on the

value of the area for a reference landscape, or affect its scenic quality; there are no known cultural or sacred sites or other unique characteristics in these areas. Table 3-37 shows the IRA's acreages within the analysis area and acreages proposed for fuels treatment.

Table 3-37. Inventoried Roadless Acres in the project area.

Area Name	Total Acres	Acres within Analysis Area	Acres Proposed for WUI Fuel Treatment
Box/Road Canyon	1,470	1,420	98
Pole Mountain/Finger Mesa	43,869	7,218	0

Research Natural Areas (RNA's) serve, at a minimum, three important functions for the Forest Service. These three functions include: reference areas, biodiversity, and research. They are located in areas receiving minimal impacts from human use. The RNA's on the Forest were selected, in part, to have limited conflicts with existing public uses and therefore located in lands that are roadless.

A portion of the Finger Mesa RNA falls within the analysis area, however as no road building, logging, or other activities specifically associated to this project will occur within the RNA no impacts would occur and the project is consistent with Management Area Prescription 2.2 (USDA Forest Service 1996, Chapter 4, pg. IV-12)

Recreation Opportunity Spectrum

Recreation Opportunity Spectrum (ROS) is defined in the USDA ROS Book and the Forest Plan FEIS 3-388 as a framework for defining classes of recreation settings, opportunities, and experiences. Recreation opportunities and experiences associated with each setting are linked to the physical landscape, remoteness and degree of human influences, social interaction, and managerial efforts. There are six ROS settings. Three of the six settings fall within the Black Mesa analysis area as shown in table 3-38

Table 3-38. Recreation Opportunity Spectrum: Settings

Setting -ROS	Forest Plan EIS	Acreages within Analysis Area	Percentage of Analysis Area
Primitive	Primitive	0	0
Semi-Primitive non-motorized	Unroaded Backcounty	3,899	8.5%
Semi-Primitive, motorized	Backcountry Motorized	3,851	8.4%
Roaded Natural	Modified Roaded	38,268	83.1%
Rural	Rural	0	0
Urban	Urban	0	0

Direct and Indirect Effects

Alternative 1 – No Action

Under this alternative, no additional activities would be implemented. This alternative could have some impacts to recreationists if the widespread effect of dead trees scattered on the ground impedes access and users ability to move around within the area. There could also be increased risks to infrastructure depending on the species of trees and facility location. A potential concern with this alternative long term could be a shift in ROS class if the area becomes more and more inaccessible due to increasing amounts of downfall. Additionally, the safety aspects of many standing dead trees could preclude the use of the area for some recreationists. There would be no change in developed and dispersed recreation opportunities provided within the analysis area. Under this alternative, travel management restrictions and

regulations would not change. Motorized travel will remain restricted to designated roads and trails; however use of retrieving game by means of the game retrieval policy could be hampered as trees fall.

All Action Alternatives

Both alternatives would have temporary effects to recreation users, especially during active timber sales with heavy truck traffic on the main roads leading into the sale areas. Timber hauling warning signs would be required on these roads to inform the public of the harvesting activities and hauling; this would reduce, but not totally eliminate, the risk to the public when driving these roads. There would be traffic impacts to recreationists using roads associated with hauling operations on active sales. These impacts would be reduced by Project Design Criteria listed in chapter 2.

Through contract clauses and contract administration, the recent improvements completed on FSR 520 would be protected.

Noise and dust from the hauling operations would be a short-term impact to developed and dispersed recreation, primarily occurring along and associated with FSR 520. Dust abatement, being applied as outlined in the design criteria (chapter 2) would reduce dust associated with hauling operations near high recreation use areas and adjacent to private land.

When sales are active during the fall months, short term effects to hunting opportunities and viewing wildlife would occur in and adjacent to the active sale area.

Winter harvesting operations would not substantially impact winter recreation opportunities as access to lakes for ice fishing would remain unchanged, no groomed snowmobile or Nordic ski routes would be impacted, and areas currently open would remain open for winter activities. Any winter impacts that may occur would be short in duration. The action alternatives would likely improve winter recreation safety in the long term by reducing potential future downfall that could pose unseen hazards just under the snow.

Under these alternatives, travel management restrictions and regulations would not change. Motorized travel would remain restricted to designated roads and trails. Existing closed roads and locked gates would improve hunting and wildlife viewing and enhance hiking and horseback riding opportunities within these motorized travel restricted areas. Recreationists utilizing the game retrieval policy would likely benefit from the action alternatives. The recreation/travel management project design criteria are feasible because they would be incorporated into the timber sale contracts to protect recreation improvements, warn visitors of hazards, and minimize impacts to forest users during periods of heaviest use.

The project design criteria have been used on other timber sales on the Forest and are an effective means of minimizing negative impacts to other forest users.

Cumulative Effects

There are no cumulative impacts to the area's recreation resources, but implementation of any of the action alternatives would result in short-term temporary impacts to recreation users while the no action alternative potentially could result in long term impacts to recreational use in the area due to the accumulation of dead and falling trees.

3.17 Transportation System

Scope of Analysis

This report focuses on road conditions within the Black Mesa analysis area and road activities needed to accomplish any proposed vegetation treatments. Spatial analysis boundaries for transportation systems are limited to the project area boundary.

Short-term timeframes for this project cover the timeframe to implement any proposed vegetation treatments which is estimated to take up to 10 years from the decision date. Long-term timeframes extend from the completion of the vegetation treatments into the foreseeable future, approximately 50 years from the decision date. The transportation system changes included in this project will be described accordingly.

Geographic information systems (GIS) tools were used to track and analyze road location mileage and density within the analysis area. The RGNF transportation atlas (USDA Forest Service 2009) was used for the analysis, which includes the inventory of routes. On-the-ground reconnaissance was completed on most project routes to observe current conditions and determine needs for short- and long-term treatments.

Past Actions that have affected existing conditions

An extensive road network was built within the project area to support past timber management activities, and to provide access to private in-holdings.

Existing Condition

There are currently about 89.8 miles of existing Forest System Roads (FSRs) within the analysis area boundary, of which 39.5 miles are closed by gates to public vehicular use. There is also about 1.58 miles of private roads in the analysis area.

Within the analysis area, recurrent road maintenance is expected to occur annually for FSRs 515, 516, and 520 under an agreement between the Forest Service and Hinsdale County. All other National Forest System roads are maintained by the Forest Service on a 5 to 6 year schedule, and for other non-NFS routes by the applicable owner and users.

Desired Condition

According to 36 CFR 212.5, the desired minimum road system is that which is "needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands".

The Forest Plan (USDA Forest Service 1996) states that the desired future condition is, "The road system continues to serve as adequate access for the public to enjoy the Forest. Road construction is limited, and the amount of reconstruction has decreased. Road closure is emphasized in some areas to enhance wildlife habitat, soil, and water resources".

A more specific desired condition was provided by a Forest level Roads Travel Analysis Process (USDA Forest Service 2004). Through this science-based process, the Forest staff determined a minimum road system and also identified unneeded roads, in accordance with 36 CFR 212.5. Each road within the analysis area was recommended for either keep/maintain storage, or decommissioning.

Keep/maintain and storage resulted in roads being added to the Forest transportation system as NFS roads. These recommendations are reflected in the current Motor Vehicle Use Map (MVUM).

Direct and Indirect Effects

Alternative 1 – No Action

Under the no-action alternative, no changes would be made to the existing transportation network in the project area. Closed (gated) roads in the project area are generally in good locations and monitored periodically for major problems. Grass and forb establishment has helped to stabilize gated roads, though tree seedling establishment may make vehicle travel more difficult over time.

Cumulative Effects

Under the no-action alternative, there would be no cumulative effects or impacts on the project transportation network.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The no-action alternative complies with the Forest Plan and State and Federal law.

Direct and Indirect Effects

Action Alternatives

Road Maintenance for Vegetation Treatment Implementation

Table 3-39, shows the miles and number of the FSRs needed for each action alternative. These roads are also displayed on the individual alternative maps (figures 2-2 and 2-3) in chapter 2.

Where necessary, these roads would have gates opened; berms removed, and would be brushed-out as necessary to provide personnel, vehicle, and equipment access to vegetation treatment units. During use, the closed roads would remain closed to public travel. The operators would be required to open, close, and lock the gates during use. After use, the closed roads would be rehabilitated and closed using gates, water bars, and seeding. The only exception would possibly be a short-term opening for public firewood gathering following harvest. Up to 2.0 miles of FSR 543 may need to be relocated to reduce the grade of the road to less than 10 percent to accommodate safe log hauling.

Table 3-39. Roads proposed for use to implement vegetation treatments Alternatives 2 and 3

Road Treatments	Alternative 2	Miles	Alternative 3	Miles
Open System Roads used	514, 514E, 515, 516, 5161A, 533, 543	28.8	514, 514.1E, 515, 516, 516.1A, 533, 543	25.4
Closed System Roads used	490, 490.1A, 514, 514.1A. 514.1B, 514.1D,	39.5	490, 490.1A, 514, 514.1F, 514.1G, 5141I, 514.1M, 539,	20.1

Table 3-39. Roads proposed for use to implement vegetation treatments Alternatives 2 and 3				
Road Treatments	**Alternative 2**	**Miles**	**Alternative 3**	**Miles**
	514.1G, 514.1H, 5141I, 514.1J, 514.1K, 514.1L, 514.1M, 514.1N, 516.1B, 516.1C, 533.1W, 533.1X, 533.1Y, 533.1Z, 539, 539.1A, 539.1B, 539.1C, 539.1D		539.1B	

Table 3-40, shows the miles of temporary roads needed to implement each alternative. Old non-system roads that are being re-used for this entry would need improvements to accommodate haul vehicles, including log trucks. These improvements could include surface blading, brush clearing, drainage installation and reshaping, turnout and turn-around construction to allow for safe and efficient use of haul vehicles and trailers.

New temporary access roads would be constructed for both alternatives. These roads would be cleared and grubbed, road prism established, drainage installed, turnout and turn-around construction to allow for safe and efficient use of haul vehicles and trailers. After use, the roads would be closed to vehicular traffic, reshaped into a hydraulically neutral state, and seeded.

Table 3-40. Temporary roads proposed for use to implement vegetation treatments Alternative 2				
Road Treatments	**Alternative 2 – Road Numbers (Unit Accessed – Road Number)**	**Miles**	**Alternative 3 – Road Numbers (Unit Accessed – Road Number)**	**Miles**
Existing old, non-system roads	6-1, 13-1, 14-1, 15-1, 15-2, 16-1, 19-1	5.4	5-1, 15-1, 15-2, 16-1, 19-1	4.4
New temporary roads	5-1, 5-2, 8-1, 13-2, 14-2, 15-3, 15-4,18-1, 18-2	3.6	5-3, 15-3, 15-4	0.9

Table 3-41 displays the summary of proposed road treatments by Operational Maintenance Level.

Table 3-41. Roads, operational maintenance levels, and likely treatments for roads used for harvest		
Maintenance Level	**FSR numbers**	**Typical Treatment**
1 - CLOSED	See table 3-39 for road list	***Pre-Haul:*** Remove slumps and slides; Replace non-functional culverts; Remove debris and downed logs; Clean catch basins; Scarify, shape and grade surface; Compact surface
		Post Haul: Outslope road; Clean catch basins; Re-vegetate (seed);Repair gate
2 - HIGH CLEARANCE VEHICLES	521,533, 541	***Pre-Haul:*** Replace non-functional culverts; Remove debris and downed logs; Clean catch basins; Scarify, shape and grade surface
		Post Haul: Clean catch basins

Table 3-41. Roads, operational maintenance levels, and likely treatments for roads used for harvest		
Maintenance Level	**FSR numbers**	**Typical Treatment**
3 - SUITABLE FOR PASSENGER CARS	513, 513.1A, 513.2A, 514, 514.1E, 515, 516, 516.1A, 520, 533, 542	***Pre-Haul:*** Replace non-functional culverts; Remove debris , downed logs; Clean catch basins; Spot rock work sections; Scarify, shape and grade surface
		Post Haul: Clean catch basins

Road Treatments for Long-term Management

Roads needed for long-term vehicular access would be maintained under this project to provide safe, efficient access, and to meet water quality Best Management Practices. Maintenance activities would include surface grading, ditch reshaping, installation of drain dips and cross drains for surface erosion control, minor culvert cleaning or installation, roadside brushing, and seeding and fertilizing of disturbed areas.

Roads needed for long-term access, but not in the immediate to near future, would be stored (maintenance level 1). Storage treatments would put these roads into an environmentally benign condition until future needs warrant reopening. Storage treatments could include a combination of blocking or gating the entrance, installation of water bars, and seeding.

Alternative 3 – Road Decommissioning

Alternative 3 has identified roads not expected to be needed for long-term management to be decommissioned, which is consistent with Forest management. Approximately 11.8 miles of road identified for decommissioning would be used to access and remove products from the proposed vegetation units. These roads would function as temporary roads and would be decommissioned after the associated vegetation activities have been implemented.

These roads are currently Maintenance Level 1 roads that would generally be decommissioned after the timber harvest completion and usually as part of the contract. Decommissioning would consist of removing culverts, installing waterbars, ripping and seeding as needed to stabilize the road surface and close them to motorized use. These road segments are currently closed to public travel and are not expected to be needed for ongoing or future management activities. Table 3-42 shows the estimated cost to decommission the road segments.

These roads were analyzed during the Forest Travel Analysis Process, and were determined to be low value/ low risk roads suitable for decommissioning. It is anticipated that the decommissioning would occur within 5 years of the completion of the timber harvest.

Table 3-42. Roads proposed for decommissioning, miles, estimated cost, Alternative 3.		
Road Number	**Miles**	**Estimated Cost**
514.1H	0.53	$6,296
514.1A	1.98	$18,330
514.1K	0.46	$3,993
514.1J	1.09	$9,463
514.1L	0.8	$9,576
514.1N	0.83	$7,206
514	1.72	$14,932
490.1A	0.51	$5,015
539.1A	0.25	$2,171
539.1D	0.26	$2,407
533.1W	0.2	$1,736

Table 3-42. Roads proposed for decommissioning, miles, estimated cost, Alternative 3.		
Road Number	**Miles**	**Estimated Cost**
533.1Y	0.58	$5,036
533.1X	1.66	$16,322
533.1Z	0.93	$8,074
Totals	**11.8**	**$110,557.00**

Storage treatments would include a combination of blocking or recontouring the entrance, scarification of the road surface where needed, placement of woody debris on the road, removal of structures (such as drainage crossing culverts) and reshaping of stream crossings, installation of water bars, and seeding. Although the road prism would remain partially intact after these treatments, it would not be useable without reconstruction.

Cumulative Effects

Under the proposed action alternatives, cumulative effects of past, present, and foreseeable actions are expected to have minor impacts on the project transportation network. In addition to the direct and indirect effects from the Black Mesa Project, road maintenance activities would also occur on NFS roads and also on adjacent State and private roads.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The proposed action alternatives comply with the Forest Plan and State and Federal law. The road system would be managed and minimized in accordance with the identified minimum road system under the Rio Grande National Forest Roads Analysis.

3.18 Scenic Resources

A person's aesthetic preferences influence whether they will approve of the way a landscape is managed. People tend to believe that beautiful landscapes are also healthy landscapes, regardless of their attitudes about environmental protection. Environmental attitudes do influence whether people believe the visual appeal of the landscape is related to ecosystem health and the appropriateness of management decisions. The public is more likely to accept management activities if they perceive the landscape in positive terms, but managers cannot assume that everyone who rates the visual appeal of a landscape as high will also accept management activities (Fowler 2008).

Scope of Analysis

This analysis reviews the scenery resource within the affected environment of the Black Mesa project area. This analysis investigates how scenery may be affected by proposed treatments based on Forest Plan direction.

This analysis was conducted using ArcMap and relevant Geographic Information System (GIS) data layers from the Forest. Global position system (GPS) tools were used to collect point data during a site visit in October of 2011. A photo record to support existing conditions analysis was created as a result of this site visit as well and will be included as digital files in the project record.

The potential impacts to scenery resources from the proposed project were determined based on the site visits to the Concern Level routes within the project area, review of photos of the project area, use of GIS and GPS data.

Past Actions that have affected Existing Conditions

Seventy seven percent (77%) of the lands within the project boundary are comprised of Forest Plan Management Areas Prescriptions that are part of the suitable timber base and/or multiple use management. As a result, viewing instances where human activity has occurred is typical. Activities that are evident include past timber harvest, grazing, road construction, facility construction (including buildings, communication sites, and transmission lines) along with developed and dispersed recreation areas.

Existing Conditions

The affected environment within the project area boundary can be characterized as having a mix of both managed and naturally appearing landscapes. High mountain scenic vistas with access to backcountry opportunities and a myriad of lakes from the transportation system are key attractions.

The following section discusses concepts or information used for scenery analysis that pertains to both existing conditions and effects on Scenic Integrity Objectives (SIOs) for each alternative.

Landscape Visibility and Distance Zones

Landscape visibility addresses the relative importance and sensitivity of what is seen and perceived in the landscape. Landscape visibility is affected by a number of factors including context of viewers, duration of view, degree of discernible detail, and number of viewers. In general, the greater the number of people likely to view a landscape and the longer the duration, the more sensitive the landscape is to modification (USDA Forest Service 1995). The proximity of the viewer to the particular landscape affects the visibility and sensitivity. Viewing distances for this analysis are:

- Immediate foreground -0 to 300 feet. Built structures or facilities that serve the public offer vantage points from which scenery can be experienced. The scenery management system regards such elements as “viewing platforms”. Roads and trails are considered viewing platforms, and are normally (as expected) visible in this immediate foreground.
- Foreground - Views from 300 feet to one-half mile as seen from viewing platform.
- Middleground -Views from one-half mile to 4 miles from viewing platform.
- Background - Views 4 miles and greater from viewing platform.

Concern Routes and Areas

The expression, Concern Level, is used to express the degree of public importance placed on landscapes viewed from travel ways and use areas (USDA Forest Service 1995). To assist in scenery analysis within the project area boundary, Concern Routes are the primary use travelways within Forest Service jurisdiction and can include both roads and trails. Closed (gated) roads; those requiring high clearance vehicles; and those considered to have low use, volume, or those providing no or little connectivity, were omitted from this analysis.

After considering those factors, the following routes were identified as having primary concern for which potential effects to scenery were analyzed:

- Hermit Lake Road (FSR 515),
- Mason Creek Road (FSR 516),
- Rio Grande Reservoir Road (FSR 520).
- 7.5 mile portion of Highway 149 (The Silver Thread Scenic Byway).

The Silver Thread Scenic byway is of national significance and is considered a primary Concern Level route for this analysis. These routes are shown in Figure 3-13.

Other areas of primary importance and use within the project area boundary are described in section 3.13, Recreation and Travel Management. All of these areas are in close proximity to or directly accessed from Rio Grande Reservoir Road, so for analysis purposes, these sites are considered part of FSR 520.

Scenic Integrity

Existing Scenic Integrity (ESI) is the measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal. Scenic integrity is used to describe an existing condition or can be applied as a standard for management. When used as a standard for management, it is called a Scenic Integrity Objective (SIO) (USDA Forest Service 1995). Landscape settings within the project area resemble Moderate to High ESI descriptions. The following describes the Scenic Integrity conditions within the project area. Figure 3-13 depicts the SIOs of the lands within the project area.

- ***High*** – Landscape setting appears intact. Human activities are not visually evident. Activities may only repeat attributes of form, line, color, and texture found in the existing attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.
- ***Moderate*** – Landscape appears slightly altered. Human activities are evident but are visually subordinate to the existing landscape character. They may repeat form, line, color or texture common to these characters, but changes in quality, size, number, intensity, etc. must remain visually subordinate, qualities or traits of a landscape that give it an image and make it identifiable or unique.

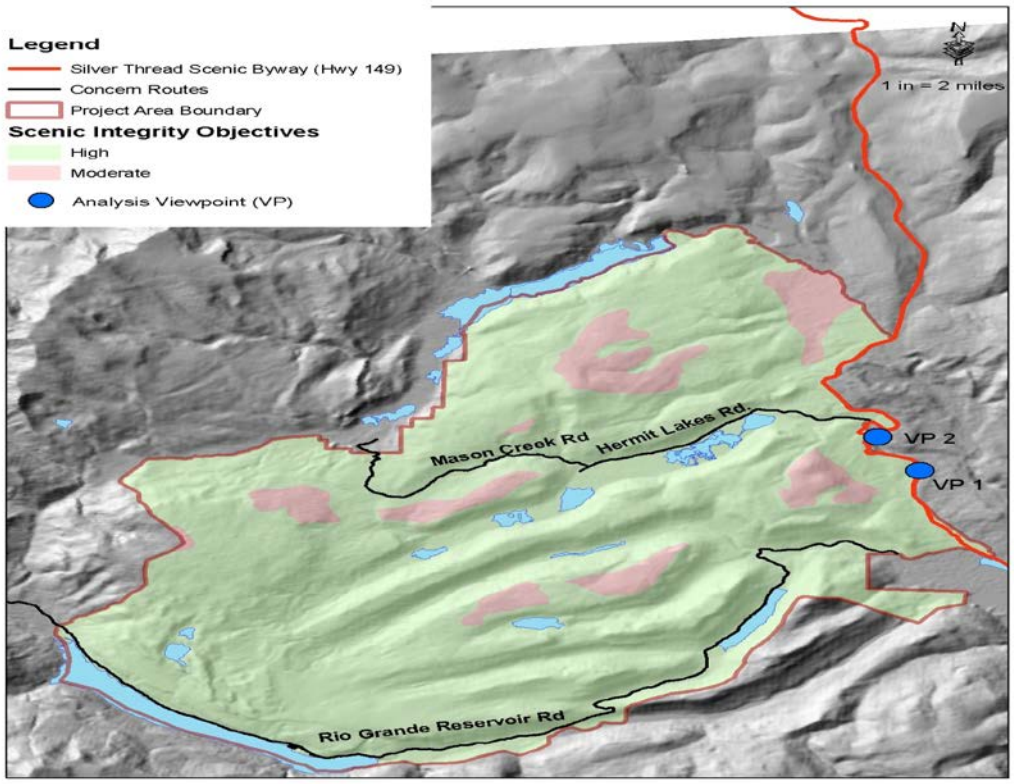


Figure 3-11. Visual representation of SIOs identified in project area, Visual Management System (Forest GIS data).

The landscape setting within the project area is characteristic of low grasslands with water bodies surrounded by steep mountainous terrain. Vegetative cover is an aspen-conifer mix with areas populated by large stands of beetle killed and dying spruce. The stands of aspen scattered throughout these landscape settings typically reveal where previously disturbed areas are progressing through natural regeneration. Aspen trees are valued for their scenic beauty (Johnson et al NA). Refer to section 3.5 Forest Management for a more detailed account of existing vegetation.

Representative Scenery Examples from Silver Thread Scenic Byway

Approximately 7.5 miles of the Silver Thread Scenic Byway (Highway 149) comprises the east boundary of the project area (figure 3-13). The views of the landscape settings that are within the project area boundary from this view platform offer scenes of both Moderate and High existing scenic integrity to the public travelling along this route. Most of these settings are seen by those travelling south to north. People travelling south will, in most cases, have their backs to these settings.

Figure 3-14 is an example of a scene from a viewpoint driving north along Highway 149 and looking west in to the project area. This view, located between the Spring Creek Reservoir Picnic Site and Bristol Head Campground, offers the most expansive view of the project area from Highway 149. The effected portion of area within the boundary is approximately one half mile from the viewpoint. The range fence in the foreground is considered a cultural or traditional

feature for such a pastoral landscape setting and its presence is overwhelmed by the greater natural landscape setting surrounding it. Although the slopes of hills seen are largely composed of beetle killed trees, only their darker tone (due to discoloration as the tree decays) is noticeable at this distance and the setting appears intact to the casual observer. As a result, this setting can be considered to have high existing scenic integrity. The stretch of road where this scene is evident (driver or passenger facing scene directly) is approximately 1.5 miles in length, so the duration of view at the legal speed limit is around 60 - 90 seconds.

Figure 3-12. Expansive landscape setting of project area as seen from viewpoint along Highway 149 resembles High Scenic Integrity.

Figure 3-15 provides another example of a scene from a viewpoint along Highway 149 driving north, and looking west into the project area. This view, located between Silver Thread and Bristol Head Campgrounds, offers the closest view of the effected portion of the project area from Highway 149. The range fence in the foreground is considered a cultural or traditional feature for such a pastoral landscape setting, but the powerline is not and stands out readily. Details such as the ragged profile of the defoliated and discolored beetle killed trees are highly noticeable from this distance. The closeness of the beetle killed trees and industrial appearing powerline lowers the scenic integrity of the setting and appears altered to slightly altered and can be considered to have moderate existing scenic integrity. The stretch of road where this scene is evident is approximately 600 feet in length, so the duration of view at the speed limit is about 5 seconds. To be seen, driver or passenger would need to look to the side, not straight ahead.

Figure 3-13. Close up view of project area as seen from viewpoint along Highway 149 resembles Moderate Scenic Integrity.

Representative Scenery Examples From within Project Area Boundary

The landscape settings seen from the Concern Level routes (FSRs 515, 516, 520, and Highway 149) when viewed to the south offer scenes comprised of grasslands with water bodies in the

foreground distance zones surrounded by steep mountainous terrain in the middle and background distance zones. The landscape character of these north facing settings is best described as having High Scenic Integrity. Views to the north are primarily in the foreground and landscape settings are characterized as being moderate to steep hillsides with sparse vegetative cover (figures 3-15 and 3-16). The landscape character of the south facing settings offer both High and Moderate Scenic Integrity due to views of powerlines, road embankments, signs, and other human activities (figure 3-17).

Overall, vegetative cover resembles an aspen-conifer mix with areas populated by large stands of beetle killed and dying Engelmann spruce. Aspen trees are valued for their scenic beauty and are key attractions in the autumn months for their brilliant foliage (Johnson et al NA).

Figure 3-14. Typical view looking south from along Herman Lakes Road resembles High Scenic Integrity**.**

Figure 3-15. Typical view looking south from along Mason Creek Rd resembles High Scenic Integrity.

Figure 3-16. Typical view looking north from along Mason Creek and Herman Lakes Roads offers settings that resemble both High and Moderate Scenic Integrity.

Spatial and Temporal Context for Effects Analysis

Management activities such as salvage timber harvesting, prescribed burning or other vegetative treatments have the potential to effect scenic quality of the forest resource by creating changes in predominate form, color, line or texture in a given viewing area. Visual impacts from these actions often depend on how much the visual result of these actions compliment or contrast with the existing scenery and associated SIOs. Associated effects to scenery typically involve:

- Activity being non-evident to the forest visitor or unseen;
- Activity is visible but subordinate to the landscape character;
- Activity is visible and dominating the landscape character when viewed from Concern Level routes.

The temporal context includes the effects of the proposed project and the effects of past, ongoing, and future activities which are/may be visible from identified platforms. Depending on viewing distance and degree of disturbance and change from existing conditions, effects may be analyzed as persisting for decades after project implementation as regeneration occurs. The Forest Plan does not place a timeframe on when SIOs must be met under the mandatory standards. For discussion purposes, effects to the visual resource can be described as during implementation, short term and long term.

Implementation – While project activity is occurring.

Within this time frame, visitors or users of the forest are typically exposed to sites of temporary roads, landings, workers, trucks, equipment, wood piles, slash piles, and burned areas (figure 3-18). Effects to scenery (that is, whether or not activities meet Forest Plan standards and

guidelines) are analyzed after project implementation, in the short and longer term. The effects described above are part of the implementation process and do not impose permanent conditions on the landscape or change their SIO, only the outcome of the project does. The examples shown below illustrate some of these temporary sights that are typical of management activity within a suitable timber management area.

Figure 3-17. Sights of activity during project implementation are common but scenic integrity objectives are evaluated on results of post activity.

<u>Short term:</u> 1-5 years after project completion

Visual recovery from past disturbances on the Forest suggests that the range for short term effects is typically 1 to 5 years. Within 1 to 5 years after project is complete, “green up” is beginning to occur. That is, vegetative recovery is starting to mask visual signs associated with activity disturbances such as stumps left from cut trees, track and tire imprints embedded in the soil, any blackened ground caused by burning, and imprint of closed and re-vegetated temporary roads. The figure at right gives an example of vegetative recovery within this time frame, taken along a roadside within the project area.

<u>Long Term</u>: 20 years after project completion.

An opening is no longer considered an opening, to meet retention or partial retention scenic condition objectives (i.e. high to moderate SIO equivalents) when the average number of trees per acre is 250 and tree height is 25 percent of the average height of adjacent stands (Forest Plan pg. III-21). Spruce and aspen that are expected re-establish through natural regeneration or planting should meet this height condition in approximately 20 to 25 years (UMN, 2003, thegrowthspot, 2007, Colorado State University, N.A.). The photo at right is an example of vegetative recovery within this time frame, taken within the project area.

Direct and Indirect Effects

<u>Alternative 1 – No Action</u>

No direct effects to scenery would result in the short term from selection of the No Action Alternative. Under this alternative there would be no harvest of dead and dying trees or any other vegetation management practices or WUI fuel reduction; hazard tree removal would be ongoing, as needed, to protect infrastructure.

The existing condition would prevail, and current trends would continue. Bark beetle activity would continue to affect the scenery into the long term, resulting in additional dead and dying trees, demonstrated by red needles and bare, dead stems.

The high degree of mortality of spruce in the project area and the resulting presence of trees with a greyish color in small pockets and large swaths throughout the landscape would increase in time and have negative effects on the scenic resources within the project area. In distant views, the landscape character ranges from appearing intact to slightly altered, depending on the number of dead trees visible. In the immediate foreground and foreground viewing distances, however, the amount of dead trees can often dominate the viewshed and landscape character, negatively affecting the scenic integrity.

The quality of the landscape character and existing scenic integrity is expected to deteriorate over time as evidence of the large scale beetle killed stands of trees within the project area becomes more prevalent and dominates the landscape.

Cumulative Effects

The current condition for the visual resource is a result of past and current activity and is covered in the Existing Condition section. Any project has the potential to add cumulative effects

to the scenic resource, since most projects have visible results. However, some projects have the potential to decrease visual effects overall. No management activities for purposes of scenery are proposed, though scenery can indirectly benefit in the long term with new vegetative diversity and the potential sprouting of new aspen stands as a result of proposed actions.

Visual impacts due to past harvests, other human activities, and developments are noticeable throughout, since most of this analysis area is approved for active management under the Forest Plan and is also a highly used recreation area.

The type of projects that could impact scenery includes future salvage harvests and hazard tree removal type projects when located in areas seen from Concern Level routes. These projects would benefit scenery in the short and long term by changing the low scenic integrity resulting from the uniform appearance created by acres of dead stands of trees to a scenic integrity level that is higher by offering landscape scenery that appears with more diversity and life because of new vegetative regeneration.

The no action alternative does not worsen or improve the current visual condition on its own, for now or in the foreseeable future; so no cumulative effects are expected.

Direct and Indirect Effects

Alternative 2 – Proposed Action

The project design criteria listed in chapter 2 would ensure the action alternatives meet all scenery related standards and guidelines, as well as minimize short term impacts.

The direct and indirect effects of the action alternatives are those related to the specific activities proposed. The following lists the actions proposed and their anticipated effect on the existing scenic integrity for the landscape setting they are located.

Salvage Harvest Activity -Units not seen from the Concern Routes listed would have no effect on scenic integrity (SI) of the landscape settings experienced by the casual Forest visitor, as management activity is not evident. Only portions of units 6, 12, and 17 are expected to be seen from Concern Routes. Design features are in place to ensure that the units repeat form and line common to the characteristic landscape and that the unnatural appearance of cut stumps would be overgrown and unseen in the short term. Upon project completion, the size and intensity of the action, along with lack of characteristic color or texture would result in lower scenic integrity than its current condition. In the short term, characteristic color and texture would begin to return as the green up period (a result of natural and managed vegetative regeneration) progresses.

Regeneration would obscure and blend seen activity effects to become obscure and blend back into the surrounding landscape setting, and resemble a moderate appearing SI description. In the long term, the amount of height and volume of regeneration is expected to once again, result in a landscape setting that appears intact and activity would no longer be visually evident to the casual Forest visitor. Seen harvest activity is expected to meet High Scenic Integrity in the long term

Where aspen is present and the salvage harvest is heavy, activity would maximize aspen regeneration by stimulating suckering on the greatest number of roots and minimizing shade on the site. Soil warm-up, sucker initiation, and sucker growth rate after emergence could be

accelerated by removal of overstory trees (Bates, 2002). Seen portions of openings where stands of aspen emerge in the long term would add to the landscape setting's scenic attractiveness.

Road System Activities -Following the completion of project activities, all new temporary road segments and old, non-system roads would be closed and rehabilitated. The NFS roads open or closed to the public for travel would not change, and landings would be rehabilitated. All roads used to access units are unseen from identified Concern Routes, so no effect on SI, as seen by the casual Forest visitor would result. The proposed road construction to relocate up to a two mile road segment that accesses unit 11 is in the middle ground distance zone from Hermit Lakes and Mason Creek Roads, and is obscured from view by terrain. Rehabilitated landings may not meet high SI upon project completion, but would by the end of the short term, as regeneration progresses and begins to soften evidence of their presence.

Hazard Tree Removal -Design features are in place to ensure that landscape settings maintain their high SI condition when hazard trees are removed in the vicinity of Concern Routes and Highway 149.

Fuel Reduction Treatments- Fuel treatments are unseen from the identified Concern Routes and would have no effect on SI of the landscape settings experienced by the casual Forest visitor. Only one fuels treatment area, located on the slope behind Hermit Lakes South has the potential to be seen. Treatments would resemble a thinning and at approximately 0.5 miles from Hermit Lakes Road, since this road is a private road, it would be observed primarily by residents versus the casual Forest visitor. However, its characteristic landscape would remain unchanged due to the size of the treatment compared to the size of the landscape setting. Project design features would ensure the landscape setting continues to resemble high SI.

Alternative 3 – Limited Action

The major difference for Alternative 3 in terms of effects to scenery is only part of unit 12 is proposed for harvest. Since this unit is closest to Highway 149, harvesting fewer acres in the unit would have fewer short term impacts than Alternative 2.

Cumulative Effects

Visual impacts due to past harvests and other human activities are noticeable throughout the management area. Harvest activity has occurred in most areas where such use of the resource is acceptable. Such a visual condition is expected in a management area that is suitable for timber harvest, with a moderate SIO.

The type of projects that could impact scenery includes future salvage harvests and hazard tree removal type projects when located in areas seen from Concern Level routes. These projects would benefit scenery in the short and long term by changing the low scenic integrity resulting from the uniform appearance created by acres of dead stands of trees to a scenic integrity level that is higher by offering landscape scenery that appears with more diversity and life because of new vegetative regeneration.

The proposed activity, in conjunction with past, current, and future activities may change existing landscape conditions as seen from Concern Routes to include Highway 149, but not in a manner that exceed SIOs in the long term.

Summary of Effects

The visual condition would result in landscape settings that directly, indirectly, and cumulatively, remain consistent with the Scenic Integrity Objectives prescribed to the project area. All pertinent standards related to scenery to include management areas would be complied with.

For scenic resources, the spatial context of the effects analysis includes areas of past, ongoing, and potential future activities outside the actions of the proposed project which have the potential to impact scenery. Based on topography and location of units within the project area, the visual results of the proposed actions are not expected to be seen or differentiated from past activity from viewpoints outside of the project area boundary except for an approximate 1.5 mile section of Highway 149 that is adjacent to the project area boundary, and views into the project area are possible and would be harvested under Alternative 2. This is due to distance and natural features that serve to limit views.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

All alternatives would meet the goals, objectives, and standards outlined in the Forest Plan.

Landscapes where actions are proposed and seen would meet their scenic integrity objectives, if not immediately upon project completion, in the timeframes described in the effects analysis.

3.19 Heritage

Scope of the Analysis

The scope of this analysis focuses on the potential impacts to heritage resources that might be reasonably expected from each alternative. Forest Service policy (FSM 2361.3) requires that all areas slated for ground-disturbing activities, or land which will leave Federal agency control through sale or exchange, be surveyed for heritage resources in order to comply with 36 CFR 800, the National Historic Preservation Act (NHPA) of 1966, as amended. The legal framework also requires that the Forest Service consider heritage resources as they relate to the Archeological Resources Protection Act (ARPA) of 1979 and the American Indian Religious Freedom Act (1979) and the Native American Graves Protection and Repatriation Act (1992). A detailed analysis is documented in a Section 106 National Historic Preservation Act (NHPA) report to be sent to the Colorado State Historic Preservation Office (COSHPO) for consultation (Krall and Steadman 2012). The report and consultation correspondence will be included in the project record.

The analysis for heritage resources is drawn from a summation of archival records and a Class II (sample) heritage resource inventory conducted within the Area of Potential Effects (APE) in 2011. The APE for this project is defined by those areas identified for salvage activities with high site potential that have not experienced previous cultural resource surveys on slopes less than 30 degrees. Because of the large scale nature of the project, a GIS model was also employed in order to define areas of high site potential by considering the variables of slope, proximity to water and vegetation type (Krall and Steadman 2012). Forest Service archeologists also spot checked portions of the analysis area previously surveyed for heritage resources in the late 1970s. During this effort, Forest Service and TEAMS Enterprise archeologists inventoried a total of 1,612 new acres for heritage resources within the APE.

Past Actions that have affected Existing Conditions

A pre-field literature search indicates that there have been 17,513 acres previously inventoried for heritage resources within the analysis boundary (Krall and Steadman 2012). These surveys indicate a very low site density within the forested areas. However, some previously recorded sites are located along meadow edges, many of them unevaluated to the National Register of Historic Places (NRHP). The previously identified archaeological sites suggest limited prehistoric seasonal exploitation of game resources, prehistoric food processing and quarrying of tool stone. Prehistoric manifestations predominantly fall within the Late PaleoIndian (8000 years before present (BP)) and the Late Archaic (2500 BP) eras. Late Prehistoric use of the analysis area is suggested by the discovery of a ceramic vessel some 50 years ago at the tail waters of Regan Lake. Some experts believe this is a rare Apachean vessel that will require further analysis. Some of the analysis area may have been subjected to intensive logging activities that occurred between the 1920s and 1950s prior to the advent of the National Historic Preservation Act (NHPA) of 1966. As such, it is possible that heritage resources have been previously impacted within the project area, though no direct evidence of past impacts was observed. Livestock grazing has occurred in the region over the past 100 years likely contributing to the cumulative impacts on heritage resources over time, especially within the Stage Station Flats area.

Much of the analysis area was heavily logged in the 1970s and 1980s. Several fish hatcheries (S-Lazy U, Hermit Lakes, and Pearl Lakes) were built in the general vicinity (1910-1940) possibly from logs taken from the Minnie Mountain area. The feature documented as part of 5HN1292 is likely evidence of early logging in the area (1920-1930). A historic telephone line (1908/1910) segment connecting the hatcheries to the outside world maybe one of its last remnants as much of the line has likely been impacted by historic logging (5HN1300.1).

Existing Conditions

A pre-field literature search indicated that there have been 22 previous heritage resource inventories conducted in or near the proposed project (Krall and Steadman 2012). During this effort, TEAMS Enterprise archaeologists documented one possible historic logging site (5HN1292), one prehistoric site (5HN1294), and one historic isolated find (5HN1293). Two sites (5HN70 and 5HN225) were revisited and re-recorded. Forest Service Archaeologists documented a historic telephone line (5HN1300.1), re-recorded and re-evaluated sites 5HN12, 5HN13, 5HN220 and 5HN221 and re-visited the Black Mountain Folsom site (5HN55) that is just outside of the analysis boundary.

Site 5HN1292 is recommended as *not eligible* to the National Register of Historic Places and site 5SH1294 was left *unevaluated* pending field testing of potential buried cultural deposits. The historic isolate (5HN1293) is *not eligible* to the NRHP. Site 5HN70 will remain *unevaluated* until it can be field tested for potential buried cultural deposits. Site 5HN225 was re-evaluated and recommended as *not eligible* to the NRHP. The historic telephone line represented by site 5HN1300.1 will remain unevaluated until more of the segment can be researched and documented. Sites 5HN12, 5HN13, 5HN220 and 5HN221 are now recommended as *not eligible* to the NRHP.

The general paucity of heritage resources over a large landscape is likely the result of two important factors. First, the project area is largely at high altitude (9,000 ft-11,000ft.) which constrains human use and occupation of the landscape during much of the year. Second, the few cultural manifestations that may exist could be masked by thick vegetation and/or blow down. The blow down and dog hair forests made it very difficult for crews to access and

inventory many areas. Because of this, the Discovery and Education Stipulation is emphasized. Fortunately most known archaeological manifestations are located on the meadow edges well outside of the currently proposed salvage units and proposed temporary road foot prints.

According to the 2004 revised regulations [36 CFR 800.4(d) (1)] for Section 106 of the *National Historic Preservation Act* (16 U.S.C. 470f) the recommended determination for the proposed action is ***no adverse effect*** if eligible and unevaluated sites are avoided, erosion is prevented and monitored and the Discovery and Education Stipulation is in place. Under the implementing regulations of Section 106 of the National Historic Preservation Act (36 CFR 800), sites considered not eligible to the NRHP may be directly affected once adequately recorded, evaluated, and concurrence is received from the State Historic Preservation Office regarding NRHP eligibility. ***Project concurrence was received from the COSHPO Office on March 1, 2012****.*

Alternative 1

Since this alternative includes no additional ground-disturbing activities, the potential for inadvertent discoveries of and damage and destruction to buried cultural deposits and aboriginal human remains would be negligible. This alternative would have no direct effect on significant heritage resources and no mitigation or monitoring activities would be necessary. However, the fuel loading that would occur under the No Action Alternative could result in negative indirect effects to significant historic resources if large scale wildfires sweep over the region.

Effects Common to all Action Alternatives

Salvage, fuels reduction treatments (thinning), tree planting, landings and new road construction all have the potential to negatively impact heritage resources. Direct negative effects to heritage resources could include the potential destruction and/or alteration of unidentified heritage resources within the APE. Activities such as road maintenance and the opening of old roads would not be expected to directly impact heritage resources if maintenance is relegated to the original road foot print. Temporary road construction has the potential to have negative direct effects on unidentified buried cultural deposits for all the action alternatives. Indirect effects from project activities can include the erosion of buried cultural deposits precipitated by temporary road construction and the removal of trees. Potential indirect effects from vandalism to heritage resources perpetrated by individuals associated with project activities is possible under each action alternative.

The loss of archaeological resources has happened in the past and will happen in the future. The cumulative effect is that over time fewer archaeological resources will be available to learn about past human lifeways, to study changes in human behavior through time, and to interpret the past to the public. Heritage resource inventory, recording, evaluating and archiving basic information about each site for future reference serves to partially mitigate potential cumulative effects to heritage resources. In conjunction with the proposed project, previous logging activities, recreation activities such as hunting, and livestock grazing have the potential to cause ground disturbance and lead to cumulative, long term, irreversible adverse effects to heritage resources. However, because the archaeological site potential appears very low within the analysis, the potential for negative cumulative effects is also low.

Alternative 2

While there is potential for direct negative effects to unidentified heritage resources from ground disturbing activities during salvage (9,410 acres), new temporary road construction (3.6 miles)

and fuels reduction (436 acres), the potential for negative direct effects is very low. Much of the area has been previously inventoried for heritage resources revealing a very low site density. Therefore, the potential for negative direct, indirect and cumulative effects to unidentified heritage resources is very low. Potential indirect effects from vandalism to heritage resources perpetrated by individuals associated with project activities is possible under each action alternative is also unlikely due to the low archaeological site density and visibility.

Alternative 3

The potential of direct, indirect and cumulative effects to unidentified heritage resources from ground disturbing activities during salvage (6,587 acres), fuels reduction (436 acres), and new road construction (0.9 miles) is the lowest of the two action alternatives. Because so much of the area has been previously inventoried for heritage resources and because there is a very low site density, the potential for negative direct, indirect and cumulative effects to unidentified heritage resources is low within this limited action alternative.

3.20 Cumulative Effects Summary for All Resources

The Council for Environmental Quality (CEQ) defines cumulative impacts as, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

"Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." In other words, cumulative effects are simply the sum total of past, present, and reasonably foreseeable environmental, social, and economic effects of land management activities which, when taken in context of this specific project, affect the conditions and trends of resources and values within the project area and adjacent area of influence.

As appropriate, each resource specialist addressed both the past actions that have affected the existing condition and cumulative effects within their section in chapter 3.

Overall, as described within chapter 3, past timber harvests, roads, development on private land, and recreation facilities on National Forest, and other activities (grazing, camping, hunting...) have shaped the analysis area into the present condition. The analysis area currently provides for a variety of recreational uses and suitable habitat for numerous wildlife species. Watersheds and sub-watersheds are in stable condition and are expected to remain so, regardless of the extensive tree mortality. Some soils with a higher clay content have been effected by past management activities, but detrimental soil disturbance is within accepted standards on the majority of the area. The vegetative community contains a diversity of plant communities which are well distributed across the landscape. Heritage, social and economic opportunities are generally limited to a mix of tourism and resource use with use of federal lands being important to counties. Forest condition is in a state of decline, due to the current spruce beetle epidemic. Spruce beetle impacts are a new factor which is capable of affecting all other resources in varying degrees.

Reasonably foreseeable activities within the analysis area include continued road maintenance with highly used roads receiving the most attention. Recreation use will continue to be relatively high, especially along FSR 520 corridor. Minor amounts of hazard tree removal will occur to

protect infrastructure on both Forest and private lands. Firewood cutters will cut dead trees within 300 feet of open roads where accessible.

Cumulative effects are summarized by alternative below.

Alternative 1 – No Action

Alternative 1, when taken in context of this specific project, and added to the sum total of past, present, and reasonably foreseeable environmental, social, and economic effects of land management activities, would have little effect upon the conditions and trends of resources and values within the project area and adjacent area of influence.

Under Alternative 1, natural processes would continue. The project area would continue to provide for a wide variety of recreational use and wildlife habitat. However, continuing tree mortality could result in some areas being less suitable for some wildlife and, as trees fall, areas could become less attractive to recreation users. Removal of hazard trees to protect infrastructure would continue, as necessary.

Suitable habitat for wildlife species would continue to be present however, over time; natural processes would create a mosaic across the land providing for a range of habitat conditions. The distribution and amount of older mature Engelmann spruce would continue to decline, reducing the habitat effectiveness for species requiring this habitat type. The value of the mature spruce-fir component to wildlife species would be impacted, but not to the extent of impacting population trends on the Forest as a whole.

Watersheds would remain in a generally healthy and stable condition. Soil conditions would continue to be maintained or improved over time. The vegetative community would continue to contain a diversity of plant communities, well distributed across the landscape. Fuel loading would increase over time as trees fall; increasing the potential for a high severity fire should a fire start. Lack of fuels reduction treatment adjacent to private land could reduce the effectiveness of fire suppression and structure protection efforts, should a wildfire occur.

Heritage, social and economic opportunities would remain limited with the exception of additional firewood available along open roads.

As the mature trees die, areas would be left to regenerate naturally, which would increase the time frame for stand re-establishment. The potential for recovering economic values from salvaging the dying trees would decline over time.

Alternatives 2 and 3

Specialist analyses and reports included within chapter 3 address the potential impacts of the action alternatives upon the various resources. Quantitatively, the impacts of the action alternatives vary only by the amount of acres proposed for salvage. Qualitatively, the acres dropped from proposed harvest under Alternative 3 were considered to have better Dense Horizontal Cover than other units and would leave better blocks of habitat that have not be disturbed by construction and other activities.

The action alternatives, when taken in context of this specific project and added to past, present, and reasonably foreseeable environmental, social, and economic effects of land

management activities, would have little effect upon the overall conditions and trends of area resources and values.

The minor impacts anticipated would be mitigated through Project Design Criteria and implementation monitoring items (chapter 2), which are incorporated into all action alternatives. Implementation of either action alternative would not have substantial effects on recreation or scenic resources; the removal of trees before they begin to fall and impede access or create a safety hazard would be beneficial.

Suitable habitat for wildlife species would continue to be present regardless of the action alternative. The distribution and amount of older mature spruce fir would be reduced, but more as a result of beetle activity than the action alternatives themselves. Logging activities would create a short-term disturbance to individuals, but following harvest, temporary roads would be rehabilitated and regeneration activities would begin; there are few long-term additional impacts to wildlife species expected. Minimal or no effects are expected for MIS, migratory birds, or their habitats.

Watersheds would remain in a generally healthy and stable condition. Decommissioning unneeded roads under Alternative 3 would be a benefit in the mid to long-term. Soil conditions would continue to be maintained or improved, as needed, following implementation. The vegetative community would continue to contain a diversity of plant communities, well distributed across the landscape. Fuel loading would be decreased preemptively; decreasing the potential for a high severity fire should a fire start. Fuels reduction treatments adjacent to private land would increase the effectiveness of fire suppression and structure protection efforts should a wildfire occur.

Economic opportunities could be improved through the opportunity to harvest the dead and dying trees. It is expected that additional firewood would be made available from slash piles, prior to their disposal by burning.

Reforestation efforts following harvest would speed the recovery of the forested areas treated in the project area and would contribute to long-term landscape diversity.

3.21 Other Disclosures

Global Climate Change

The Forest Service acknowledges that global climate change is an important emerging concern worldwide. However, there is no established scientific methodology to measure the effects of small-scale projects such as this project on global climate. This analysis briefly addresses global climate change in two ways: 1) effects of climate change on a proposed project, and 2) effects of a proposed project on climate change. Each of these is briefly discussed below relative to this project.

Effects of climate change on a proposed project

The National Environmental Policy Act (NEPA) does not specifically require analysis of how environmental factors, such as global climate change, might impact a proposed action. Any

differences in effects of climate change on the project between alternatives (including no action) would be negligible.

Effects of proposed project on climate change

The proposed activities are extremely small in scope and magnitude relative to a planetary scale. Although it may be possible to quantify a project's direct effects on carbon sequestration and greenhouse gas (GHG) emissions, there is no certainty about the actual intensity of individual project indirect effects on global climate change. Cumulative effects would be a consideration of GHG emissions affecting climate from multiple projects over time. But, as GHG emissions are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide a practical or meaningful effects analysis for project decisions. Any differences between alternatives (including no action) would be negligible at a global scale.

3.22 Compliance with Laws and Regulations

Forest Plan Consistency

As disclosed in chapter 1, this EIS is tiered to the Final Environmental Impact Statement for the Rio Grande National Forest Land and Resource Management Plan (Forest Plan). It documents the analysis in the second level of planning.

As part of the Forest Plan, land has been divided into Management Area Prescriptions (MAPs) which differ from each other in resource emphasis. The MAPs that fall within the Black Mesa Project area were fully discussed in chapter 1; spatial location of these MAPs within the project area can be found in figure 1-3, chapter 1 of this EIS.

Disclosures within this EIS and project file resource reports clearly display that implementation of the Action Alternatives, including the Project Design Criteria, mitigation, and monitoring measures, are consistent with the Forest Plan standards and guidelines, Desired Conditions (goals) and objectives. Implementation of either action alternative would contribute toward meeting Forest Plan Desired Conditions and objectives for MAPs 5.13 and 4.21, which are part of the suitable timber base.

National Forest Management Act (NFMA)

The Forest Plan was prepared under the 1982 Planning Rule and was amended in 2003 to include management indicator species. NFMA and accompanying regulations under the 1982 planning rule (36 CFR 219, 1982 version) require that specific findings be documented at the project level. For convenience, the discussion below is presented in terms of the 1982 rule.

Compliance with the National Forest Management Act (NFMA) is clearly displayed in resource discussions found within this EIS. A detailed discussion of NFMA compliance points, as outlined in the Code of Federal Regulations (CFR) 36 CFR 219.27(a) through 219.27(g) can be found in the project file. Because this EIS involves vegetative management treatments, NFMA compliance items covered under 36 CFR 219.27(b) "Vegetative Manipulation", 36 CFR

219.27(c) "Silvicultural Practices", and 36 CFR 219.27(d) "Even-aged Management" are summarized below.

Resource Protection

219.27(a)(1): Conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land;

Both action alternatives conserve soil and water resources and would not result in permanent impairment of land productivity. Water resources are protected by Best Management Practices including no-harvest buffers and other Project Design Criteria. Soil resources would be protected by re-using existing skid trails and landings, minimizing addional compaction and erosion, and maintaining coarse woody debris for long term soil productivity. If compaction exceeds standards following harvest, subsoiling or other prescribed mitigation would be implemented within 5 years to reduce compaction, thereby maintaining long-term productivity.

219.27(a)(2): Consistent with the relative resource values involved, minimize serious or long-lasting hazards from flood, wind, wildfire, erosion,… excepted as in wilderness;

Action alternatives would be designed to minimize erosion. Hazards from windthrow to infrastructure will be reduced. The risk of wildfire will not be reduced, but the severity of a possible future wildfire could be reduced by the removal of a portion of the fuels in harvested areas prior to a wildfire occuring.

219.27(a)(3): Consistent with the relative resource values involved, prevent or reduce serious, long lasting hazards and damage from pest organisms…in the long-term be ecologically acceptable and compatible with the forest ecosystem and multiple use objectives of the plan;
Pest-host relationships were evaluated against situation-specific prescriptions; salvage harvest was determined to be an ecologically acceptable treatment and the most compatible with the multiple use objectives for Forest Plan MAPs 5.13 and 4.21 where the Forest Plan placed an emphasis on the protection of commercial timber resources by including the areas in the suitable timber base.

219.27(a)(4): Protect streams, streambanks, shorelines, lakes, wetlands, and other bodies of water.
See response under *219.27(a)(1).* All streams and wetlands will be protected from disturbance during harvest activities under both action alternatives.

219.27(a)(5):Provide for and maintain diversity of plant and animal communities to meet overall multiple use objectivies.
No Threatened or Endangered plants have been reported on the Forest, nor are there any suspected occurrences. One species of Sensitive plant may be effected by an action alternative, but if the plant occurred, the determination is that individuals may be impacted, but it would not likely result in a loss of viability or cause a trend toward federal listing. Canada lynx is the only Tor E wildlife species that would be potentially affected by an action alternative. Based on the consistency of the proposed activities with the Southern Rockies Lynx amendment, the Forest Service determination is that project activities “may affect, but are not likely to adversely affect” the lynx or its habitat (Biological Assessment, project file).

219.27(a)(6): Provide for adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species…habitat for species choosen to be maintained and improved.
Implementation of any alternative is not expected to affect the viability of any wildlife or fisheries population (see Wildlife and Fisheries reports).

219.27(a)(7): Assess prior to project implementation.. for potential impacts and consistency with multiple uses planned for the general area;
This EIS assess the potential physical, biological, social, aesthetic, cultural, engineering, and economic impacts and consistency with multiple uses planned in the project area.

219.27(a)(8): Include measures for preventing the destruction or adverse modification of critical habitat for T&E species. Project Design Criteria will protect habitat and neither action alternative would result in exceeding the exemptions and exceptions provided for under the Southern Rockies Lynx amendment 2008 programmatic Biological Opinion.

219.27(a)(9-11): Transportation and utility corridors; Roads designed to standard of use, re-establish vegetative cover on disturbed areas within a reasonable period. Neither action alternative would result in a change in the existing motorized transportation system currently open to public use. Road segments proposed for decommissioning under Alternative 3 would be consistent with long-term needs. Revegetation of disturbed areas is planned for and expected following use.

219.27(a)(12): Be consistent with maintaining air quality at a level that is adequate for the protection and use of National Forest System resources and meets or exceeds applicable Federal, State, and/or local standards or regulations. Based on the discussion in Chapter 3, Air Quality, neither action alternative would have measurable effects to local air quality, including visibility or haze in the Weminuche Wilderness Area. All air quality standards would continue to exceed Federal standards.

Vegetative Manipulation

219.27 (b)(1): "Be best suited to the multiple use goals established for the area with potential environmental, biological, cultural resource, aesthetic, engineering, and economic impacts, as stated in the regional guides and forest plans...".
In chapter 3, each resource is evaluated as to how each alternative addresses multiple use goals that are inherent in the Forest Plan standards and guides (S&G). As described in these effects discussions, all action alternatives comply with Forest Plan S&G. The Forest Plan S&G are a product of the Regional guides and these S&G's were developed specifically for the Rio Grande National Forest.

219.27 (b)(2): "Assure that lands can be adequately restocked as provided in paragraph (c)(3) of this section, except where permanent openings are created for wildlife habitat improvement, vistas, recreation uses and similar practices."
No permanent openings are being created under any alternative. In proposed harvest treatment areas, any acres requiring regeneration would be a direct result of bark beetle activity and not directly caused by salvage activity. Best Management Practices , along with past experience in the spruce-fir forest types, provide reasonable assurances they these areas would be successfully regenerated.

219.27 (b)(3): "Not be chosen primarily because they will give the greatest dollar return or the greatest output of timber, although these factors will be considered."
While economics and outputs will be considered in the decision process, other factors related to reducing the impacts of the bark beetle and protection of resources within the project area, as described in chapters 2 and 3, would be the primary focus to determine the best action to implement. The reasons for the decision will be fully described in the Record of Decision.

219.27 (b)(4): "Be chosen after considering the effects on residual trees and adjacent stands."

Acres proposed for salvage under the action alternatives were those most affected by the bark beetles that are located in harvestable areas. Effects on other stands and residual trees are discussed in chapter 3 under Timber Management and Wildlife and under Section 2.4, Design Criteria for Action Alternatives. Actions proposed to be implemented under each action alternative are believed to best meet the project purpose and need, while addressing the issues that drove alternative formulation.

219.27 (b)(5): "Avoid permanent impairment of site productivity and ensure conservation of soil and water resources."
Best Management Practices (BMPs) incorporated as part of Regional Watershed Conservation Practices and implemented as part project design and contract initiation are designed to minimize impacts to site productivity and ensure conservation of soil and water resources. These are discussed in chapter 3 under the Soils and Watershed sections. Project Design Criteria and Monitoring (Sections 2.4 and 2.6) are also included to further protect these resources.

219.27 (b)(6): "Provide the desired effects on water quantity and quality, wildlife and fish habitat and other resource yields".
The analysis of the action alternatives, show that there would likely be minimal change to water quantity in any of the affected watersheds. Since the trees being harvested are dead or dying, their removal would not increase water quantity. Existing understory vegetation would likely use any/most of additional available water. Affects to water quality and fish habitat would be negligible due to the relatively dry conditions in the vicinity of most salvage units and along with the implementation of the required BMPs and Project Design Criteria.

219.27 (b)(7): "Be practical in terms of transportation and harvesting requirements, and total cost of preparation, logging, and administration."
The transportation and harvest methods described are capable of being implemented, based on the silvicultural information and transportation plan. Cost effectiveness was considered by planning primarily to use the existing transportation system and focusing the harvest on land suitable for ground-based logging equipment. Leave tree marking and other cost effectiveness techniques would be used to minimize sale preparation costs. The current economic situation has lowered the expected value of the timber resoource, but the cost:benefit anaysis does not account for other expected benefits that are not easily quantified (i.e. infrastructue protection, public safety and ease of use of the area, and the potential of high severity fire in a high use area).

Silvicultural Practices (1982)

219.27 (c)(1): "No timber harvesting shall occur on lands classified as not suited for timber production pursuant to 219.14 except for salvage sales ... These lands shall continue to be treated for reforestation purposes if necessary to achieve the multiple-use objectives of the plan.
The proposed activities are salvage harvest; units proposed for salvage have been evaluated and confirmed as generally suitable. All harvest activities would be in full compliance with management requirements and consistent with the Forest Plan silvicultural systems by Forest Cover Type (Forest Plan pg. III-17).

219.27 (c)(2):The selected sale schedule provides the allowable sale quantity for the first planning period. Within the planning period, the volume of timber to be sold in any one year may exceed the annual allowable sale quantity so long as the total amount does not exceed the allowable sale quantity. Nothing in this paragraph prohibits salvage or sanitation harvesting of timber stands which are substantially damaged by fire, windthrow, or other catastrophe, or which are in

imminent danger of insect or disease attack and where such harvests are consistent with silvicultural and environmental standards. Such timber may either substitute for timber that would otherwise be sold under the plan or, if not feasible, be sold over and above the planned volume.
Since volume sold under either alternative is salvage, it is not required to be within the Forest Allowable Sale Quantity(ASQ) of 21 MMBF/year. However, this volume will be offered as part of the Forest's regular timber sale program. Sale of any volume proposed under the Proposed Action or Action Alternative would not result in exceeding the ASQ for the planning period.

219.27 (c)(3): When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands within 5 years after final harvest. Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to result in adequate restocking ....

Under both action alternatives, dead and dying bark beetle infested trees would be cut to obtain economic recovery, reduce fuel loads, accelerate reforestation, and protect infrastructure. Due to the amount of advanced regeneration, only in the areas where bark beetle populations have killed substantial numbers of trees would an unstocked opening likely be created, and regeneration activities become necessary. Regeneration in these areas would not be a result of silvicultural treatments aimed at achieving timber production objectives, but are a result of bark beetle mortality.

Though in the harvest treatment sites, the NFMA 5 year requirement does not apply, the agency has made a commitment to ensure that these sites would meet mimimum stocking levels within five years of harvest. Past experience and research has indicated that successful reforestation at similar sites is possible.

Monitoring would be used to assess the success of regeneration efforts following project completion. Desired results and forest plan standards would be specifically stated in the detailed silvicultural prescriptions written for each stand.

219.27 (c)(4): "Cultural treatments such as thinning, weeding and other partial cutting may be included in the forest plan where they are intended to increase the rate of growth of remaining trees, favor commercially valuable tree species, favor species age classes which are most valuable for wildlife, or achieve other multiple-use objectives."

No cultural treatments are proposed as part of this EIS.

219.27 (c)(5): Harvest levels based on intensified management practices shall be decreased no later than the end of each planning period if such practices cannot be completed substantially as planned.
This management requirement does not apply to this project. Salvage is not an intensified management practice.

219.27(c)(6). Timber harvest cuts designed to regenerate an even-aged stand of timber shall be carried out in a manner consistent with the protection of soil, watershed, fish ...resources, and the regeneration of the timber resource.
The salvage harvest proposed is not designed to be an even-aged treatment, though the level of mortality in most stands could result in a final removal cut and stands would be in a regeneration stage. As discussed in chapter 3, BMPs and Project Design Criteria are designed to protect soil, water, and instream resources. Examples of protection measures include: retention of adequate ground cover, including coarse woody debris; snag retention;. harvest

restrictions in critical soil and watershed areas; wet condition restrictions; and use of designated skid trails and landings (re-using as many of the skid trails and landings from previous harvests as possible).

219.27 (c)(7): Timber harvest and other silvicultural treatments shall be used to prevent potential damaging population increases of forest pest organisms. Silvicultural treatments shall not be applied where such treatments would make stands susceptible to pest-caused damage levels inconsistent with management objectives.

The epidemic population levels of spruce beetle in the vicinity of the project area indicates that the majority of mature Engelmann spruce trees are likely to be attacked and die. At this stage of the epidemic, salvage of dead and dying trees will not increase the susceptibility of any residual trees to damage or insect attack.

219.27 (d): Even-Aged Management (16 USC 1604 (g)(3)(f)) - The National Forest Management Act states that clearcutting is to be used on National Forest System lands only where it is determined to be the optimum method.

Salvage is the proposed treatment in conifer areas under both action alternatives. Clearcutting is not a proposed treatment. The level of spruce beetle mortality and stand composition would determine the post-harvest condition. However, acres that have been heavily impacted by spruce beetles may result in some areas being "under-stocked" (not fully meeting desired trees per acre or desired `species composition goals) due to bark beetle activity; under agency policy these area would be coded as a regeneration harvest under FACTS business rules. Damage to live trees that have survived the bark beetle infestation would be minimized by strict adherence to contract requirements for protection of residual green trees.

Long term management objectives have not been established for the project area. Based on the SRLA, the goal will be to provide a mosiac of habitat conditions across the landscape. Spruce beetles have killed a large proportion of the overstory, creating a more even-aged condition. All stands would have an option in the future to manage as even or uneven-aged, depending on desired conditions. Managing the future stands to facilitate an uneven-aged distribution would take a longer timeframe.

219.27 (d)(1): "Openings shall be located to achieve the desired combination of multiple-use objectives ... Regional Guides shall provide guidance on dispersion of openings As a minimum, openings in forest stands are no longer considered openings once a new forest is established ... Forest plans may set forth variations to this minimum based on site-specific requirements for achieving multiple-use objectives ... Regional guides shall provide guidance for determining variations to this minimum in the forest plan ...".

Refer to the discussion under 219.27 (d)(2), below.

219.27 (d)(2): Individual cut blocks, patches, or strips shall conform to the maximum size limits for areas to be cut in one harvest operation established by the regional guide ... This limit may be less than, but will not exceed, ... 40 acres for all other forest types except as provided in paragraphs (d)(2)(i) through (iii) of this section. (i) - Cut openings larger than those specified may be permitted where larger units will produce a more desirable combination of net public benefits ... (ii) - Size limits exceeding those established in paragraphs (d)(2) and (d)(2)(i) of this section are permitted on an individual timber sale basis after 60 days' notice and review by the Regional Forester ... (iii)- The established limit shall not apply to the size of areas harvested as a result of natural uncharacteristic condition such as fire, insect and disease attack, or windstorm.

There are no live tree treatments proposed under this EIS. All commercial treatments are to salvage dead and dying spruce, so opening size limitations are not applicable.

219.27 (e)- Riparian Areas –
All action alternatives include the incorporation of Forest Plan Standards and Guidelines, BMPs, and Project Design Criteria to protect riparian areas in the project area.

219.27 (f)- Soil and Water Conservation –
Conservation of soil and water resources are the basis of all action alternatives. Project Design Criteria are included to minimize additional ground disturbance. Re-use of old landings, skid trails, and old non-system roads are part of the design of all action alternatives. New temporary roads would be minimized to the extent possible by requiring longer skid distances, as necessary. The Forest Plan standard to limit detrimentally disturbed soils to a maximum of 15% of any unit (Forest Plan III-10, #1) would be met under all action alternatives following harvest activities. Subsoiling or other mitigation of deterimentally disturbed areas such as landings, temporary roads, or skid trails in units that have been determined to have >12 percent detrimental disturbance would follow sale completion.

16 USC 1604(m) Culmination of Mean Annual Increment
Since this requirement does not apply to thinning, salvage, sanitation, or other harvests designed to achieve non-timber resource objectives, it does not apply to this project.

Clean Water Act

The Clean Water Act (CWA) requires each state to implement its own water quality standards. The streams within the Black Mesa project watersheds are designated under the waterbody ID CORGR02_5400, main stem of Rio Grande and its tributaries above Willow Creek. Designated uses include agriculture, domestic water source, recreation primary contact, and aquatic life cold water. Status is listed as good for all designations, except aquatic life which has not been assessed. The Beneficial Uses and good quality of water in the streams in the project area would be maintained during and following project implementation through the proper implementation of BMPs and Project Design Criteria, chapter 2.

Clean Air Act

Based on discussions in Section 3.13, Air Quality, implementation of either action alternative would not have a measurable effects to local air quality, including the Weminuche Wilderness Area.

Executive Order 11990

This order requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In compliance with this order, Forest Service direction requires that an analysis be completed to determine whether adverse impacts would result.

Both action alternatives would be compliance with this E.O since no ground disturbing activities will occur within 100 feet of any wetland, seep, or spring. These areas have been or will be identified prior to implementation. Impacts from adjacent or nearby areas will be prevented through implementation of Project Design Criteria.

Endangered Species Act

Based on discussions in chapter 3 concerning threatened and endangered wildlife species and the analysis contained in the Biological Assessment located in the project file, it has been determined that the action alternatives “may effect, but not likely to adversely affect” Canada

lynx, since both action alternatives would be in compliance with the 2008 Southern Rockies Lynx Amendment.

National Historic Preservation Act

Based on the discussions in chapters 3 concerning Heritage Resources, and project file documentation, it has been determined that there will be no adverse effects to any Historic Properties if eligible and unevaluated sites are avoided, erosion is prevented, and the Discovery and Education Stipulation is in place relative to any action alternative. Concurrence was received from the Colorado State Historic Preservation Office on March 1, 2012.

Executive Order 12898- Environmental Justice

Based on the discussion in chapter 3, Social-Economic section, no adverse affects to minority or low income populations were identified during scoping or the analysis of this project.

Roadless Area Conservation

Both action alternatives comply with the current Forest Plan Inventoried Roadless Area management direction.

Relationship between Short-term uses and Long-term Productivity

The relationship between the short-term uses of the environment and the maintenance and enhancement of long term productivity is complex. For this analysis, it was assumed that short term uses were those that generally occur on a yearly basis (i.e.livestock grazing as a use of the forage resource, timber harvest as a use of the available wood resource, and recreation uses).

Long term refers to longer than 10 years. Productivity refers to the capability of the land to provide market and non-market outputs and values for future generations. Soil and water are the primary factors of productivity and represent the relationship between short term uses and long term productivity.

Both Action Alternatives studied in detail, incorporate sustained yield of resource outputs in varying degrees, while maintaining resource productivity. The specific Project Design Criteria included in the alternatives ensures that long term productivity would not be impaired by the application of short term uses. Therefore, for every alternative, the long term productivity is assured. This conclusion is based on disclosures for each resource in chapter 3 and silvicultural findings in the Project File.

Irreversible or Irretrievable Commitment of Resources

Irretrievable resource commitment applies to losses of production, harvest, or commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irretrievable Resource Commitments

Vegetation: Where permanent roads are constructed or reconstructed and the soil displaced, there is an irretrievable loss of the type of vegetation that occurs. For temporary roads, skid trails and landings, vegetation is re-established on the disturbed areas, but the type of

vegetation may be changed from timber to grasses and forbs in these areas, at least in the short to mid-term.

Scenic Resources: Where trees are harvested there would be an irretrievable loss of an unaltered environment from selected Routes of Concern in the short term (refer to Scenic section). It is estimated that recovery would begin within five years following harvest and would meet scenic integrity objectives within a maximum 20 to 25 years, depending on the number of remaining trees and aspen response.

Social/Economic: Where there is no commercial wood fiber recovered, such as No Action, there would be an irretrievable loss in income and employment in the local economy for a short period of time, or, until new sources of supply could be found. Refer to the Social/Economic section for detailed discussions by alternative. To compensate for a lack of supply of timber, firms reach outside their normal market area for sources of supply. This, in turn, drains resources available to other firms, who then must reach outside their market areas, creating a ripple effect.

Irreversible Resource Commitments

Irreversible resource commitment applies primarily to the use of nonrenewable resources, such as minerals or Heritage resources, or those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.Two types of irreversible resource commitments would occur as a result of implementation of any of the action alternatives:

Energy Resources: Fossil fuels used in processing wood products which would result from an action alternative would be an irreversible loss.

Other Resources: There could be a limited irreversible loss in soil/rock resources used in road reconstruction by use of existing and potential borrow pits.

No other irreversible resource commitments were determined as a result of the implementation of an action alternative. This would result due to the adherence to Forest Plan S&G and alternative mitigation for resources involved.

Plans and Policies of Other Jurisdictions

As evidenced from responses to scoping, and other public involvement solicitations, no conflicts have been identified between the objectives of other Federal, State, and local governments and Indian tribes, with the action alternatives, nor have any been identified relative to No Action.

CHAPTER 4 - LIST OF PREPARERS, AGENCIES CONSULTED, LIST OF DEIS AND FEIS NOTICE OF AVAILABILTY CONTACTS_____

Table 4-1. IDT Members.

Core IDT Members	Degree(s)	Years Professional Experience	Position Title
Diana McGinn	BS Range-Forest Management; BS Wildlife Biology, Colo. State Univ.	25	Natural Resource Planner
Kirby Self	BS Forest Management, Colo. State Univ.	24	Supervisory Forester
Dale Gomez	BS Wildlife Biology, Colo. State Univ.	23	Wildlife Biologist
Vaughn Thacker	MS Soil Fertility & Plant Nutrition & Ag System Technology, Utah State Univ. BS Environmental Soil & Water Science, Utah State Univ.	6	Soil Scientist
Sid Hall	Technical Fuels Management Applied Science-Animal Health, Adams State College	11	Prescribed Fire & Fuels Specialist
Supporting IDT Members			
Dean Erhard	-BS Forestry, University of Mont. -MS Rangeland Resources, Oregon State Univ.	27	Ecologist (retired)
Jody Fairchild	BS Environmental Biology, Minor Business Administration, Adams State College	17	Natural Resource Specialist
Rachael Sanchez	BS Forest Management; BS Natural Resource Management, Colo. State Univ.	2	Forester
Gary Frink	BS Geology, Adams State College	26	Engineer/ Transportation planner
Guy Blackwolf	B.S. Range Resources, Oregon State University B.S. Wildlife Science, Oregon State University	9	Rangeland Management Specialist
Angie Krall	-BA Anthropology Colorado College -MA Applied Anthropology, Northern Arizona University	19	Archeologist
Barry Wiley	-MS Wildlife Biology, Southwest State Texas Univ.- BS Wildlife Management, Southwest State Texas Univ.	16	Fisheries Biologist
Kevin Duda	MS Forestry, Colo. State Univ. BS Forestry, Colo. State Univ.	4	Forester
Tom Eager	PhD Insect Ecology, Univ. of Calif. Berkeley MS Forestry, Utah State Univ. BS Forest Resource Management, Univ. of Calif. Berkeley	16	Entomologist
Tricia Burgoyne	M.S. Soil Science, Univ. Mont. B.S. Forest Management, Univ. Wisconsin-Madison	5	TEAMS Soil Scientist
Mike North	BS Forest Management University California at Berkley	28	TEAMS Supervisory Forester/ Logging Engineer
Mattew Boisseau	MLA Landscape Architecture, Texas Tech Univ. BS Recreation, Norwich Univ.	12	TEAMS Landscape Architect
Dustin Walters	MS Natural Resource Conservation, University of Montana,	10	TEAMS Soil Scientist
Debbie Miller	BS Aerospace Engineering MS Forest Sciences	14	Regional Air Quality Specialist

The Forest Service consulted the following Federal, State, and local agencies and groups, Tribes, and non-Forest Service persons during the development of this document.

Table 4-2. Agencies and Tribes Consulted
Colorado Parks and Wildlife
Environmental Protection Agency
US Fish and Wildlife Service
Colorado State Historic Preservation Office
Hinsdale and Mineral County Commissioners
Hermit Lakes Homeowners Association
S Lazy U Homeowners Association
Pearl Lakes Homeowners Association
Ute Tribe of the Uintah & Ouray Reservation
Navajo Nation
Pueblo of Santa Ana
Taos Pueblo
Pueblo of Nambe
Ohkay Owingeh
Hopi Tribe
Santa Clara Pueblo
San Ildefonso Pueblo
Jicarilla Apache Tribe
Santa Domingo Pueblo
Pueblo de Cochiti
Southern Ute Indian Tribe
Ute Mountain Ute Tribe
[a] *Also received a DEIS notification letter*

Table 4-3. DEIS Notice of Availability Contacts

Contact	**Format**	**Contact**	**Format**
Acquisitions & Serials Branch, National Agricultural Library	CD, letter	Freemons Property Co, LTD	letter
Alpine Lumber & Log Home Co.	letter	Gattis Family Partnership	letter
Ancient Forest Rescue	letter	Ronni Eagan, Great Old Broads for Wilderness	letter
Charles Powers, Antlers and Rio Grande Lodge	letter	Hayley, Hayley, & Hayley	letter
Damon Gibbons, 4 UR Ranch	letter	Hermit Lakes Recreation Club	letter
Ed Wintz, Bear Creek Ranch	letter	High Country Citizens Alliance	letter
Anne Pizel, Broken Arrow Ranch & Land Company	letter	Charles Nearburg, La Soleil-Broadacres Ranch	letter
Joanie Berde, Carson Forest Watch	Letter,	Ronald Bruce, Hinsdale	letter

Table 4-3. DEIS Notice of Availability Contacts			
Contact	**Format**	**Contact**	**Format**
	Hardcopy	County Sheriff	
Chief of Naval Operations (N45), Energy and Environmental Readiness Division	letter	Robert Hurd, Hinsdale County Commissioners	letter
Ted & Debbi Dooley, Circle Divide Outfitters	letter	Andrew Hurd, Hurd Brothers Logging	letter
Don Riggle, Colorado 500	letter	Matt Ismert, Wilderness Ranch	letter
Brent Woodward, Colorado Parks and Wildlife	letter	Anthony Moore, Independent Log Company	letter
Rick Basagoitia, Colorado Parks and Wildlife	letter	Tom Troxel, Intermountain Forest Industry Association	letter
J Wenum, Colorado Parks and Wildlife	letter	Kolish Lumber Inc.	letter
Federal Highways, Colorado HDA-CO	letter	Lost Trail Ranch	letter
Jeff Burns, Colorado State Forest Service	letter	Mineral County Commissioners	letter
Nancy Fishering, Colorado Timber Industry	letter	Mineral County Land Use Administer	letter
Libraries - Documents Processor, Colorado State University	Hardcopy	Monte Vista Chamber of Commerce	letter
John Howard, Continental Ranch	letter	Mountain Views at Rivers Edge RV Resort	letter
Creede Chamber of Commerce	letter	John Baxter, Mountain Valley Lumber	letter
R. Shane Birdsey, Creede Guide & Outfitters	letter	Nature Conservancy	letter
Jerre Guthals, Creede OHV Club	letter	National Environmental Coordinator, NRCS	letter
Rex Shepperd, Creede Timber Watch	letter	Cathy Carlson, National Wildlife Federation	letter
Philip Davis	letter	Martin Reynolds, Park Grazing Association	letter
Depps Transportation & Houselogs	letter	Pearl Lakes Trout Club	letter
Deputy Director APHIS PPD/EAD	letter	Phipps La Garita Ranch	letter
Director OEPC	letter	Ron Pleasant, Pleasant Logging & Milling Inc.	letter
Director, NEPA Policy & Compliance, DOE	letter	Tom Sobel, Quiet Use Coalition	letter
Director, Planning and Review, Advisory Council on Historic Preservation	letter	Dusty Hicks, Powder Connection	letter
Divide Timber	letter	Ray Jordan, Ptarmigan Meadow HOA	letter
Laura McCarthy, Forest Guild	letter	RC Guest Ranch & Circle Divide Outfitters	letter
Sammy Frazier, Frazier Outfitting	letter	Regional Director, Northwest Mountain Region, Federal Aviation Administration	letter
Freemons Guest Ranch	letter	Ralph Curtis, Rio Grande Water Conservation District	letter
Kirk Cunningham, Rocky Mountain Chapter of Sierra Club	letter	U.S. Army Corps of Engineers, South Pacific Division CESPD-CMP	letter
R. E. Vann, Director Renewable Resources, Rocky Mountain Regional	letter	U.S. Coast Guard, Environmental Impact Branch	letter

Table 4-3. DEIS Notice of Availability Contacts			
Contact	**Format**	**Contact**	**Format**
Office		G-MEP	
Richard Doyon, Rocky Mountain Timber Products, Inc	letter	U.S. Environmental Protection Agency, Region 8	Hardcopy, CDs
Rocky Smith, Rocky Mountain Wild	letter	US .Fish & Wildlife Service, Kurt Broderdorft,	letter
Brian Rue, Rue Logging, Inc	letter	Wason Ranch	letter
Dwaine Rue, Rue Logging, Inc.,	letter	Bryan Bird, Wildearth Guardians	letter
Tracy Vanderpool, , S Lazy U Trout Club	letter	Avery Augur	letter
Jimbo Bickerood, San Juan Citizens Alliance	letter	Barbara Jo Kipp	letter
San Juan Ranch	letter	Bill & Carol Pierce	letter
San Juan Snowcat	letter	Bob Kukuk	letter
Brett Shawcroft, SLV Cattlemen's Association	letter	Caleb Simon	letter
San Luis Valley Irrigation District	letter	Carol Ann Getz	letter
Sam Satterwhite, Satterwhite Companies Inc	letter	Carolyn Skinner	letter
David & Verna Schmittel, Schmittel Packing & Outfitting	letter	Charles Leavell	letter
Mark Pearson, Sierra Club	letter	Cliffton Jones	letter
Josephine Pearce, Silver Thread Scenic Byway Committee	letter	Dale Pizel	letter
Silverthread Outdoor Recreation Club	letter	Dave & Eloise Hooper	letter
SLV Ecosystem Council	letter	David Hamilton	letter
Jim Martin, Snowcountry Explorers	letter	David Scherer	letter
Margaret Lamb, Sowards Ranch	letter	Delen Coln	letter
Steve Lamb, Sowards Ranch	letter	Dennis Shepherd	letter
Joe Larson, Stimpson Lumber Co.	letter	Don & Rosemary Hollenshead	letter
Thomas Holland,	letter	Doyle Hanbury	letter
Gerald Faucette, TimberLine Cattle Company	letter	Ed Karper	letter
Todd Enterprises, Inc	letter	Jan Klecker	letter
Tom Payne, Tom Payne Outfitting	letter	Ed Knight	letter
Robert Getz, Trail Skill, Inc.	letter	Gene Hawkins	letter
David Nickum, Trout Unlimited	letter	Glen Sparrow	letter
U.S. Army Corps of Engineers, Northwestern Division	letter	H. Braxton Neely	letter
H.C. Noelke	letter	Ronald B. Russell	letter
Jack Sisco	letter	Steve Lewis	letter
James W. Harrington	letter	Steve & Nancy Albright	letter
James Jones, Jones Family Trust	letter	Sarah Garrett	letter
James Stiegler	letter	William Philburn Jr	letter
JB & Ginger Alexander	letter	Victoria Grover Cavit	letter
Jean Kipp	letter	Young Life	letter
Jerry & Ronna Cochran	letter	Zeke Ward	letter

Table 4-3. DEIS Notice of Availability Contacts			
Contact	**Format**	**Contact**	**Format**
Jessie Gilmer	letter	Peggy Frese	letter
Jim Turnbull	letter	Phil Leggit	letter
Jim & Louise Pomeroy	letter	Poppy Borland	letter
Joe & Pam Kocman	letter	Randy Riggs	letter
Pat & Linda Ussery	letter	Raymond Wright	letter
Johnsons & Lisa Pryor Trust	letter	Richard & Vickie Brownrigg	letter
Judith Vincent	letter	Richard DePriest	letter
Ken Swinehart	letter	Richard & Cathy Ormsby	letter
Ken Wyley	letter	Robert Portman	letter
Sandy Kroll	letter	Robert Seago	letter
Louise Davis	letter	Robert Siddons	letter
Marty Steward	letter	Robert Watkins	letter
Mary Ann Harigrove	letter	Peggy Frese	letter
Mary Linda Reyburn Fox	letter		
Mike Rupert	letter	Office of Honorable Michael Bennet	CD, letter
Nada Gates	letter	Office of Honorable Scott Tipton	CD, letter
Pam Houston	letter	Office of Honorable Mark Udall	CD, letter
Patrick Noack	letter	Office of Honorable Gail Schwartz	CD, letter
Paul Hosselkus	letter	Office of Honorable Edward Vigil	CD, letter

Table 4-4. FEIS Notice of Availability Contacts.

Contact	Format	Contact	Format
Bob Prentice		Acquisitions & Serials Branch, National Agricultural Library	CD, letter
Jim Moore, Hermit Lakes Recreation, Inc.	letter	Chief of Naval Operations (N45), Energy and Environmental Readiness Division	letter
Joanie Berde, Carson Forest Watch	Letter, Hardcopy	Federal Highways, Colorado HDA-CO	letter
Wayne and Virginia Humphrey	letter	Libraries - Documents Processor, Colorado State University	Hardcopy
Robert Hurd, Hinsdale County Commissioners	letter	National Environmental Coordinator, NRCS	letter
Tom Troxel, Intermountain Forest Industry Association	letter	Deputy Director APHIS PPD/EAD	letter
Mineral County Commissioners	letter	Director OEPC	letter
Patricia and Daniel Moore	letter	Director, NEPA Policy & Compliance, DOE	letter
Pearl Lakes Trout Club	letter	Director, Planning and Review, Advisory Council on Historic Preservation	letter
Ray Jordan, Ptarmigan Meadow HOA	letter	Regional Director, Northwest Mountain Region, Federal Aviation Administration	letter
Sammy Frazier, Frazier Outfitting	letter	U.S. Army Corps of Engineers, South Pacific Division CESPD-CMP	letter
H. Braxton Neely	letter	U.S. Coast Guard, Environmental Impact Branch G-MEP	letter
Director Renewable Resources, Rocky Mountain Regional Office	letter	U.S. Environmental Protection Agency, Region 8	Hardcopy, CDs
Rocky Smith, Rocky Mountain Wild	letter	US .Fish & Wildlife Service, Kurt Broderdorft,	letter
Tracy Vanderpool, , S Lazy U Trout Club	letter	U.S. Army Corps of Engineers, Northwestern Division	letter
David & Verna Schmittel, Schmittel Packing & Outfitting	letter	U.S. Department of Interior , Office of Environmental Compliance	letter
Gerald Faucette, TimberLine Cattle Company	letter	Office of Honorable Michael Bennet	CD, letter
Poppy Borland	letter	Office of Honorable Scott Tipton	CD, letter
Randy Riggs	letter	Office of Honorable Mark Udall	CD, letter
Robert Siddons	letter	Office of Honorable Larry Crowder	CD, letter
Montrose Forest Products	letter	Office of Honorable Edward Vigil	CD, letter
Martin Reynolds, Park Grazing Assoc.	letter		
Pearl Lakes Trout Club	letter		
Jeff Burns, Colo. State Forest Service	letter		
Ronni Eagan, Great Old Broads for Wilderness	letter		
SLV Ecosystem Council	letter		
Hinsdale County Commissioners	letter		
Mineral County Commissioners	letter		

APPENDIX A _____

A.1 Terms and Definitions

Term	Definition
Advanced Regeneration	Seedlings and saplings that develop under an existing stand of trees.
Artificial Regeneration	A group or stand of young trees created by direct seeding or by planting seedlings or cuttings
Basal area (BA)	Cross-sectional area, in square feet, of a tree measured at dbh, diameter at breast height (4.5 feet above ground).
Board Foot (BF)	Measure of an amount of timber equivalent to a piece of lumber 12 inch by 12 inch by 1 inch.
Coarse Woody Debris (CWD):	Woody materials greater than 3 inches in diameter.
Commercial Forest Products	Sawlogs, small roundwood, biomass, and other forest products removed in the process of harvesting or cutting trees from NFS lands.
Concern Levels	A measure of the degree of public importance placed on landscapes viewed from travelways and use areas. They are divided into three categories: **Level 1-High**-heavily used travelways and use areas where viewers have a high concern for scenery. **Level 2-Moderate**-moderately used travelways and use areas where viewers have a moderate concern for scenery. **Level 3-Low**- little used travelways or areas where there is little or no concern for scenery.
Cover Type	A taxonomic unit of vegetation classification referencing existing vegetation. Cover type is a broad taxon based on existing plant species that dominate, usually within the tallest layer.
DBH	Tree diameter at 4.5 feet above the ground.
Desired Conditions	A set of ideal conditions established for a Management Area Prescription within the Forest Plan. These conditions are the goals for the Management Area and the intended end results for all actions taken within it. Desired Conditions for each specific Management Area Prescription are outlined in Chapter IV of the Revised Land and Resource Management Plan of the Rio Grande National Forest.
Endangered plant:	A plant that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Even-aged management	The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested.
Existing Scenic Integrity	Represents the status of the landscape and the degree to which it has been altered. This is a baseline measurement for Scenic Resources. The following is a list of the Scenic Integrity Levels: **Type I** (Natural Appearing Landscapes)-areas in which on ecological change has taken place except for trails needed for access. They appear untouched by human activities. This included wilderness and primitive areas. **Type II** (Slightly Altered Appearing Landscapes)-areas where some human activity has occurred. Usually these areas can be described as near natural appearing or slightly altered. **Type III** (Altered Appearing)-areas where human modification has occurred and is obvious. Usually these areas are described as altered.
Fine Slash	Branches, leaves and limbs less than 3 inches diameter.
Fire Behavior	The manner in which a fire reacts to the variables of fuel, weather, and topography

Term	Definition
Fuel Break	A wide strip or block of land on which the fuels have been modified so that fire burning into it can be more readily contained.
Fire Intensity	The rate of energy or heat release per unit time, per unit length of fire front, regardless of its depth.
Fuel Loading	The amount of fuel on site expressed in Tons per Acre.
Fuel Profile	The representation of various fuel characteristics (size class, loading, volatility, density, etc.) in terms of vertical and horizontal arrangement, amount, and continuity.
Fire Regimes	The nature of fires occurring over extended period of time. Fire Regimes reflect the fire environment, and influence the type and abundance of fuel, thereby affecting fire behavior and fire effects through time.
Fire Severity	A qualitative indicator of the effects of fire on an ecosystem, whether it affects the forest floor, canopy, or some other part of the system.
Fuels	Available vegetation, both live and dead that is capable of combustion and can contribute to fire spread.
Group Selection Harvest	An uneven-aged harvest system in which trees are removed and new age classes are established in small groups, rather than evenly-spaced individual trees. Natural regeneration is thereby established in pockets, but still under the protection of a partial forest canopy.
Heritage Resources	Are sites, features, and values having scientific, historical, educational, and/or cultural significance. They include concentrations of artifacts, structures, landscapes, or settings of for prehistoric or historic events.
Heritage Resource Inventory	A systematic on-the-ground search designed to identify the locations of heritage resources. Heritage resources identified in such inventories are recorded on State of Colorado cultural resource site forms which includes determination of the significance of individual sites.
Historical Range of Variability	A method to understand the dynamic nature of ecosystems; the processes that sustain and change ecosystems; the current state of the ecosystem in relationship to the past; and the possible ranges of conditions that are feasible to maintain.
Indicator	A measurement of a resource quantity or quality, which is linked to a cause-and-effect relationship and responsive to a key issue. Indicators are used to compare the effects among alternatives, and are most generally quantitative, rather than qualitative, in measure.
Intermediate Shelterwood Harvest	One intermediate step of the shelterwood harvest system in which the canopy cover is opened up through the removal of mature trees to promote natural regeneration and stand vigor. This step is prior to final harvest.
Key Issue	A concern expressed over the potential effects of a proposed action on the human environment, due to the geographic extent, duration, or intensity of interest or resource conflict. Key issues are used to develop and compare alternatives, prescribe mitigation measures, and analyze the environmental effects. For an issue to be considered Key, it must be relevant to the specific project and appropriately addressed at that level
Ladder Fuels	Intermediate height fuels
Landtype Association	An ecological mapping unit based on similarities in geology, soils, and plant associations. Repeatable patterns of soil complexes and plant communities are useful in delineating map units. LTAs are an appropriate ecological unit to use in Forest- or area-wide planning and watershed analysis. On the RGNF, soil mapping units were aggregated into 13 distinct LTAs.
Long-Butt	A section cut from the bottom log of a tree and culled because of rot or other defect.
Natural Regeneration	The establishment of a plant or a plant age class from natural seeding, sprouting, suckering, or layering.
National Forest System road ~	A forest road other than a road which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority.
Non-system Road	Also termed “Unclassified Roads.” Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that

Term	Definition
	have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).
Noxious Weeds	A plant specified by law as being especially undesirable, troublesome, and difficult to control.
Operational maintenance level	The maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns. It defines the level to which the road is currently being maintained (FSH 7709.59, 62.3). **Maintenance levels** ~ Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria. **Level 1.** Closed roads that have been placed in storage between intermittent uses. The period of storage must exceed 1 year. Basic custodial maintenance is performed to prevent damage to adjacent resources and to perpetuate the road for future resource management needs. These roads are not shown on motor vehicle use maps. **Level 2.** Roads open for use by high clearance vehicles. Passenger car traffic, user comfort, and user convenience are not considerations. Motorists should have no expectations of being alerted to potential hazards while driving these roads. Traffic is normally minor. **Level 3.** Maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Warning signs and traffic control devices are provided to alert motorists of situations that may violate expectations.
Preparatory cut	An optional type of cut that enhances conditions for seed production and establishment applied under the shelterwood regeneration methods.
Reforestation	The re-establishment of forest cover, either naturally or artificially. This process usually maintains the same forest type and is done promptly after the previous stand or forest was removed.
Regeneration method	Cutting procedure by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, selection, and coppice. Regeneration methods are grouped into: coppice, even-aged, two-aged, and uneven-aged.
Road decommissioning (FSM 7705)	Activities that result in the stabilization and restoration of unneeded roads to a more natural state. Activities may include up to 5 levels of treatment: block entrance; re-vegetation and waterbarring; remove fills and culverts; establish drainage and remove unstable road shoulders; full obliteration recontouring and restoring slopes.,
Road Maintenance	The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective (FSM 7712.3).
Road Construction (New)	Activity that results in the addition of forest classified or temporary road miles (36 CFR 212.1).
Road Reconstruction	Activity that results in improvement or realignment of an existing classified road a) **Road Improvement.** Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function. b) **Road Realignment**. Activity that results in a new location of an existing road, or portions of an existing road, and treatment of the old roadway (36 CFR 212.1).
Road Spot Reconstruction	Road reconstruction activities on very short sections of road. Generally involve activities such as culvert replacement and surface rock replacement
Salvage	Removal of dead trees or trees being damaged or dying due to injurious agents other than competition, to recover value that would otherwise be lost.
Sanitation	Removal of trees to improve stand health by stopping or reducing actual or anticipated spread of insects and disease.
Seral	The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.
Shelterwood Harvest	The removal of a stand in a series of usually three cuts over a period of time. Regeneration of the new stand occurs under the cover of a partial forest canopy. A final harvest cut removes the shelterwood and permits the new stand to develop in the open

Term	Definition
	as an even-aged stand.
Silvicultural system	A planned series of treatments for tending, harvesting, and re-establishing a stand. The system name is based on the number of age classes (i.e. even-aged, two-aged, uneven-aged) or regeneration method (i.e. clearcutting, seed tree, shelterwood) used.
Soil Compaction	Soil that has a 15% increase in bulk density over natural undisturbed conditions.
Soil Erosion Hazard	A rating of a soils potential to erode.
Stand	A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and so form a silvicultural or management entity.
Stocking	The degree to which trees occupy the land, measured by basal area or number of trees by size and spacing, compared with a stocking standard such as the basal area or number of trees required for full utilization of the land's growth potential
Structure Class	A classification of forested cover types which aggregates Habitat Structural Stage into broader categories.
Succession	The process of vegetative and ecological development whereby an area becomes successively occupied by different plant communities.
System Roads	Also termed "Classified Roads." Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).
Temporary Road	A road necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or a forest trail and that is not included in a forest transportation atlas..
Threatened plant	A plant that is in danger of extinction throughout all or a significant portion of its range.
Uneven-aged stand	A stand of trees of three or more distinct age classes, either intimately mixed or in groups.
Trap Tree	A log or tree felled or treated in a manner to invite insect infestation, particularly bark beetles.
Water Influence Zone (WIZ):	The land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain, riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of the mature dominant vegetation, whichever is most.
Wildfire	A fire that burns uncontrollably in a natural setting (e.g., a forest, or grassland).

A.2 Acronyms

AOI – Annual Operating Instructions

AMP – Allotment Management Plan

BA – Basal Area

BF- Board Foot

CCF – Hundreds of Cubic Feet

CEQ – Council on Environmental Quality

CWD- Course woody debris

CWPP – Community Wildfire Protection Plan

DBH – Diameter at Breast Height

DN – Decision Notice

EA – Environmental Assessment

EIS – Environmental Impact Statement

DAU – Data Analysis Unit

DEIS – Draft Environmental Impact Statement

DHC – Dense Horizontal Cover

FAR –Functioning at Risk

FEIS – Final Environmental Impact Statement

FSH – Forest Service Handbook

FSR – Forest System Road

FVS – Forest Vegetation Simulator

HRV – Historical Range of Variability

HUC – Hydrologic Unit Code

IDT – Interdisciplinary Team

IRA – Inventoried Roadless Area

LTA – Landtype Association

LAU – Lynx Analysis Unit

MAP – Management Area Prescription

MBF – Thousand Board Feet

MIS – Management Indicator Species

MMBF – Million Board Feet

NEPA – National Environmental Policy Act

NFMA – National Forest Management Act

PDC – Project Design Criteria

PFC – Properly Functioning Condition

RGNF – Rio Grande National Forest

ROS – Recreation Opportunity Spectrum

RNA – Research Natural Area

SISS –Stand Initiation Structural Stage

SREI - Soil Resource Ecological Inventory

SRLA – Southern Rockies Lynx Amendment

TES – Threatened or Endangered Species

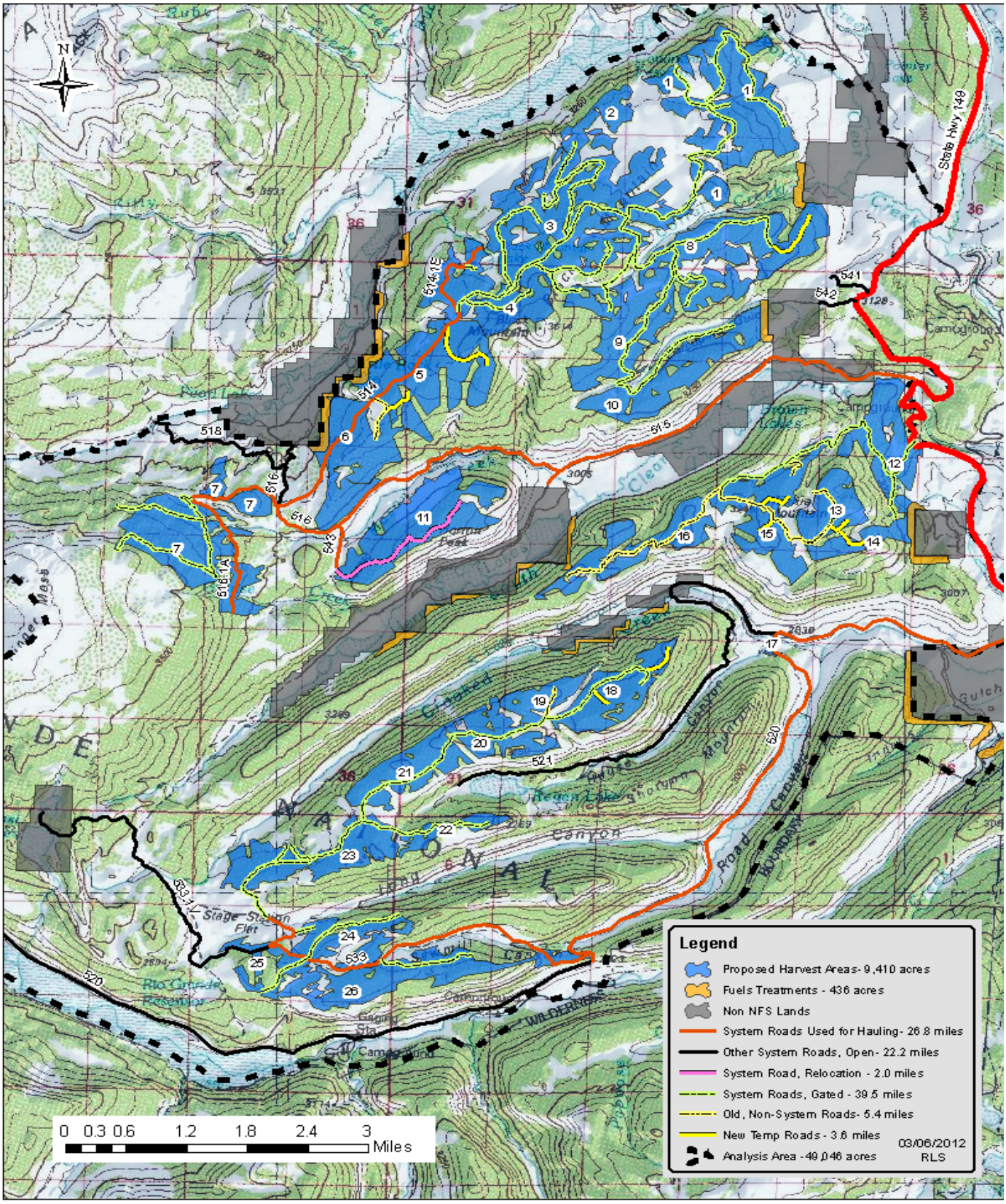
WIZ – Water Influence Zone

WUI – Wildland Urban Interface

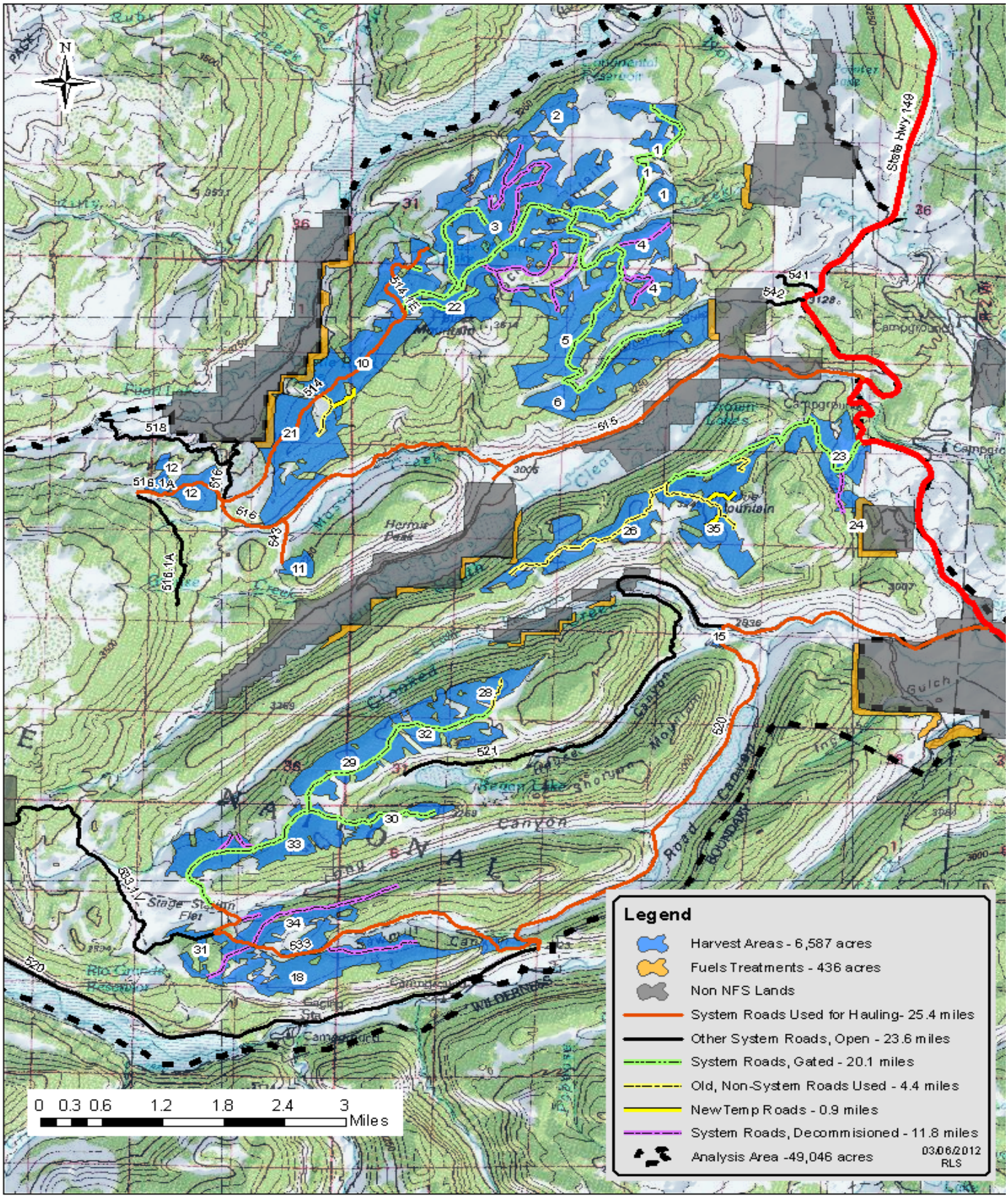
APPENDIX B - MAPS

ATTENTION

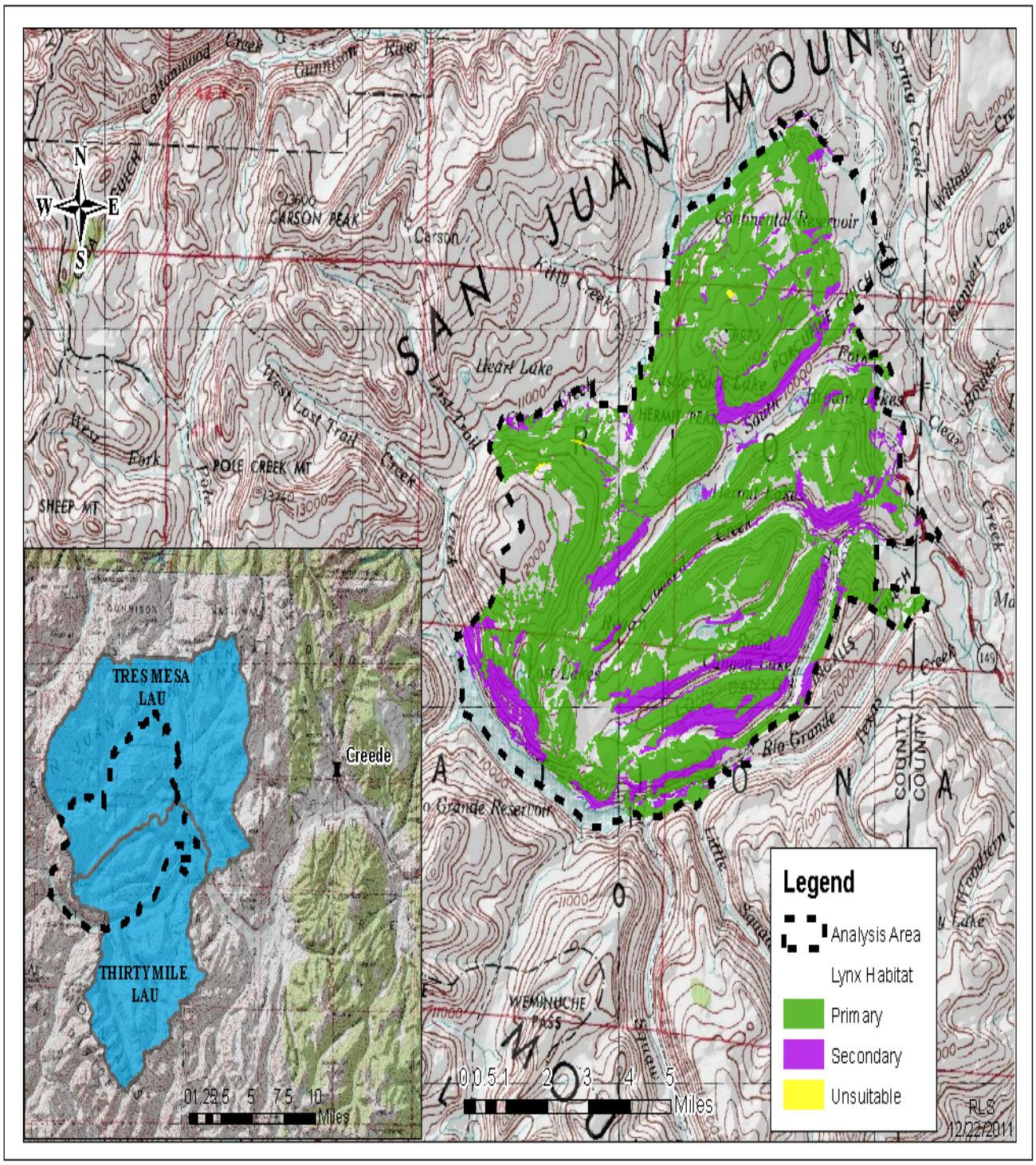
These products are reproduced from geospatial information prepared by the U.S. Department of Agriculture, Forest Service. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace, GIS products based on new inventories, new or revised information, and if necessary in conjunction with other federal, state or local public agencies or the public in general as required by policy or regulation. Previous recipients of the products may not be notified unless required by policy or regulation. For more information, contact the Rio Grande National Forest, Divide Ranger District, 719-657-3321.



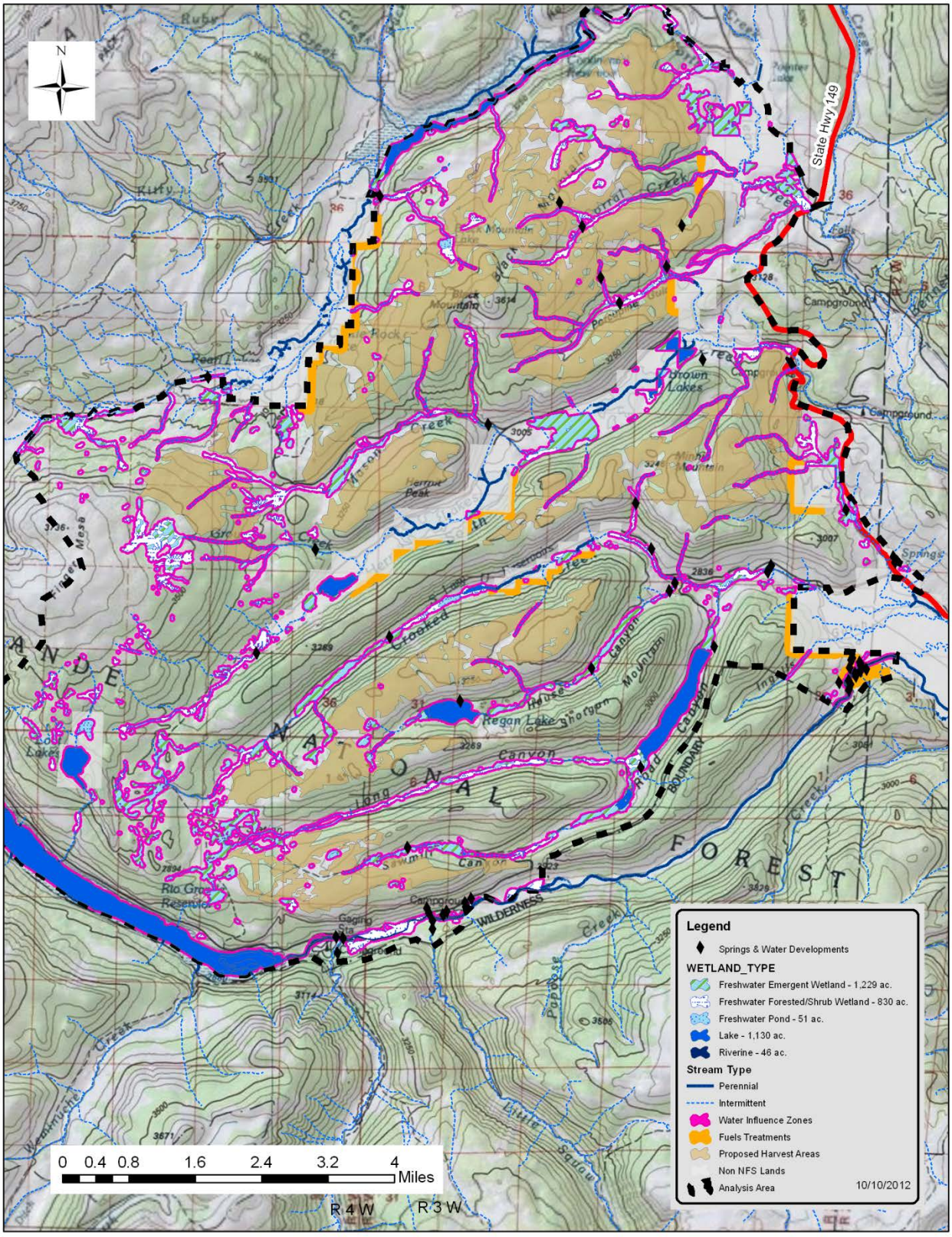
Map B-1 – Alternative 2 – Proposed Action with unit numbers



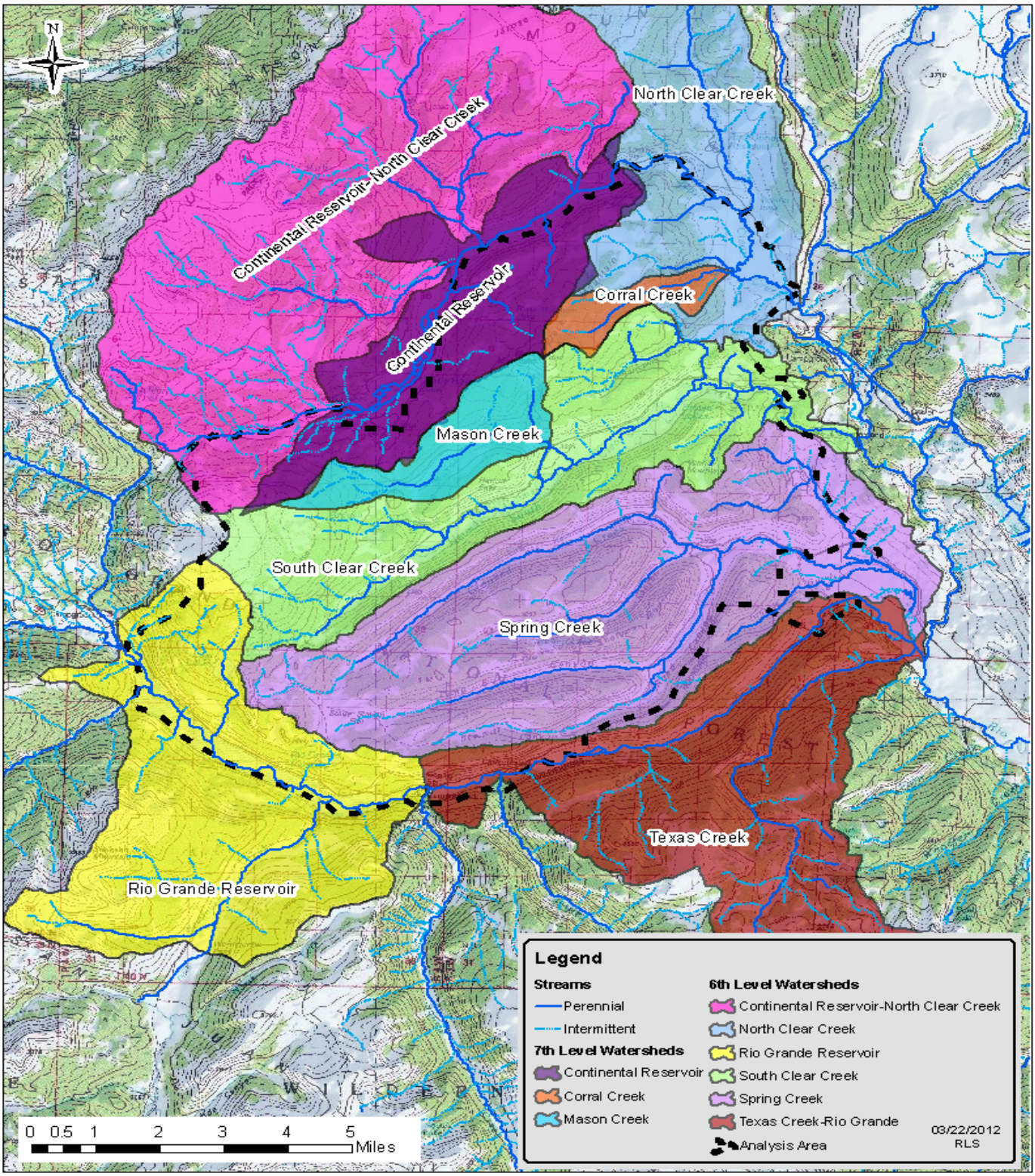
Map B-2.- Alternative 3 – Limited Action with unit numbers.



Map B-3. Canada lynx LAUs and lynx habitat classification in Black Mesa analysis area.



Map B-4 - Water influence zones buffers for wetlands and streams along with springs and wells, shown with Alternative 2 proposed salvage units.



Map B-5. Watersheds – 6th and 7th Level, Black Mesa Analysis Area.

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APPENDIX D

Soil characteristics and limitations, Black Mesa Project Area

Soil Classification	MUS	Parent Material	Drainage	Texture	Limitations	Erosion Hazard	Ac	Units	Special Notes
Ustic argicryolls, typic haplocralfs	108	Andesite/Tuff	well drained	Loamy-skeletal		Mod	60	24	
ustic argicryolls, frigid lithic argiustolls	109	Andesite/ Volcanic breccia	well drained	Loamy-skeletal	Steep slopes with high erosion hazard	High	60	25, 26	
frigid lithic argiustolls	113	Volcanic breccia	well drained	Loamy-skeletal	Steep rock outcrops	High	136	1, 6	
Haplocryolls	124	Alluvium	poorly drained-moderately drained		Floodplains, wet soils	Mod	22	1-4, 8-10	Avoid these areas with GB equipment
Haplocryalfs	125	volcanic materials	well drained	Loamy-skeletal	Higher clay content; rock outcrops; steep	High	317	1, 2, 4, 8, 9	
Haplocryolls, Haplocryepts	126	volcanic materials	well drained	Clayey-skeletal	Higher clay content, dissected topography, rock outcrops	High/ Mod	359	25, 26	
Haplocryepts	127	volcanic materials	well drained	Loamy-skeletal	Steep slopes	Mod	24	4, 5	
Crohemists, Cryaqolls	128		Poorly to very poorly drained		Floodplains and sedge areas	Low/ Mod	18	2	Avoid these areas with GB equipment
Humicryepts	129	Glaciated basalt	well drained	Loamy-skeletal	Rock outcrop and Rubble land	High	2	7	
Isotic typic dystrocryepts, superactive lithic haplocryepts	137	Volcanic Tuff	well drained	Loamy-skeletal		Moderate	192	11, 23	
Superactive eutric haplocryalfs	139	Landslide deposits/glacial till/volcanic materials	well drained	Loamy-skeletal	Slumped slopes, landslide formations, high mass movement potential	Moderate	4	17	Avoid harvesting these 4 acres in unit 17
sSuperactive eutric haplocryalfs, superactive typic haplocryalfs	140	Tuff/Volcanic bedrock	well drained	Loamy-skeletal	Thin surface	Moderate/ High	3394	1-4, 6, 7, 9-18, 22, 24, 26	
superactive eutric haplocryalfs, superactive mollic glossocryalfs	141	glacial morraine (volcanics)	well drained	Loamy-skeletal	Thin surface	Moderate	404	10, 12, 24-26	
Superactive eutric halocryalfs, superactive ustic haplocryepts	142	Volcanic materials	well drained	Loamy-skeletal	High compaction hazard; Some steep slopes with thin organic matter	Moderate	308	5, 6, 9, 21	Log on dry or frozen soils
Superactive Typic dystrocryepts, isotic typic dystrocryepts	149	glacial till/volcanic materials	well drained	Loamy-skeletal	Acidic, high elevation, cold soils with short growing season	Moderate	96	11	

Soil Classification	MUS	Parent Material	Drainage	Texture	Limitations	Erosion Hazard	Ac	Units	Special Notes
Superactive typic dystrocryepts, superative eutric haplocryalfs	152	Glaciated volcanics/glacial morraine	well drained	Loamy-skeletal	Large boulders, surface acidity	Moderate	358	23	
Superactive ustice haplocryepts, typic haplocryalfs, lithic haplocryepts	155	granitic/volcanics	well drained	Loamy-skeletal	Shallow soils	Moderate	449	16, 19-21	
Superactive ustic argicryolls	157	Glacial till/outwash terraces	well drained	Loamy-skeletal	Grasslands	Moderate	67	24, 26	
Superactive ustc argicryolls, ustic argicryolls	159	glaciated volcanics	well drained	Loamy-skeletal	Grasslands	Moderate/ High	45	8, 11, 15, 16, 17, 20	
Superactive ustic argicryolls, frigid lithic argiustolls	160	glaciated volcanics/volcanic breccia	well drained	Loamy-skeletal	Grasslands with steep rocky areas	Moderate/ High	170	1-3, 8	
Rock Outcrop/Rubble land	162	Volcanic	N/A	N/A	Rock outcrop and Rubble land	N/A	45	1, 3	
Superactive lithic haplocryolls	165	Volcanic materials	well drained	Clayey-skeletal	High clay content, proper drainage necessary to lower erosion hazard, high compaction hazard; Seep areas present and should be avoided	High	3441	1, 2-11	dry or frozen soil required; located and avoid seeps

Soils -Current Conditions Summaries by unit

Unit #	CWD (T/Ac.)	Coarse Fragments	Total Organics (cm)	Current Detrimental Disturbance	Slope	Aspect	Texture	Parent Material
1	10.94	10-40%	4	19%	0-10%	varies	loam-skeletal with some clay	glacial till over volcanics
2	2.54	25-35%	3	14%	0-20%	N,NE	loam- with some clay	glacial till over volcanics
3	16.46	20-60%	4	16%	0-25%	N/NE	loam	volcanics
4	7.02	20-35%	5	13%	5-35%	N,NW	loam	glacial till/volcanics
5	6.08	25-40%	4	11%	5-45%	varies	clay loam/loam	glacial till/volcanics
6	2.28	20-70%	2	8%	5-35%	NW,SE,W	clay loam/loam	glacial till/volcanics
7	11.54	10-50%	4	14%	5-40%	E,N	loam	volcanics
8	5.58	25-30%	4	20%	0-45%	varies	loam-skeletal with some clay	glacial till over volcanics
9	11.12	25-35%	4	8%	10-35%	varies	loam-skeletal	glacial till over volcanics
10	4.52	35-50%	2	11%		varies	loam	glacial till

Unit #	CWD (T/Ac.)	Coarse Fragments	Total Organics (cm)	Current Detrimental Disturbance	Slope	Aspect	Texture	Parent Material
11	1.78	20-45%	2	2%	5-45%	NW	skeletal clay loam/loam	andesite/volc/glacial till
12	6.24	20-40%	4	11%	10-60%	varies	skeletal clay loam/loam	volcanics
13/14	3.56	30-50%	3	8%	0-45%	varies	clay loam/loam	volcanics
15	1.96	10-40%	3	6%	10-40%	varies	skeletal loam/clay loam	volcanics
16	4.22	20-40%	3	11%	10-20%	varies	loamy skeletal	
17	5.34	5-25%	4	14%	5-30%		loam	volcanics
18	4.2	30-45%	3	13%	0-45%	N	clay loam	glacial till/volcanics
19	4.62	10-25%	2	10%	0-10%		clay loam	volcanics
20	8.8	20-40%	3	13%	0-15%		loam/sandy clay loam	volcanics
21	4.56	30-35%	4	11%	5-35%	S	gravelly loam	glacial till
22	4.62	25-40%	2	13%	0-15%		loam/clay loam	glacial morraine/volcanics
23	7.64	20-45%	3	7%	5-45%	varies	gravelly loam/clay loam	volcanics/glacial till/morraine
24	5.28	20-35%	4	14%	5-35%	N,S	loam	glacial till/volcanics
25	5.7	15-30%	2	12%	0-10%		clay loam/skeletal loam	volc/glacial till
26	7.96	15-30%	3	10%	0-60%	varies	clay loam/skeletal loam	volc/glacial till

Soils Cumulative Effects Considerations by Unit

Unit #	Alternative 2				Alternative 3			
	Unit Acres	Current % Detrimental Soil Disturbance (DSD)	Threshold Acreage (15% DSD)	Current Acreage in DSD	Unit Acres	Current % Detrimental Soil Disturbance (DSD)	Threshold Acreage (15% DSD)	Current Acreage in DSD
1	734	19%	110	139	206	19%	31	39
2	474	14%	71	66	474	14%	71	66
3	643	16%	96	100	643	16%	96	100
4	415	13%	62	53	414	13%	62	53
5	590	11%	89	62	316	11%	47	33
6	435	8%	65	34	424	8%	64	33

Unit #	Alternative 2				Alternative 3			
	Unit Acres	**Current % Detrimental Soil Disturbance (DSD)**	**Threshold Acreage (15% DSD)**	**Current Acreage in DSD**	**Unit Acres**	**Current % Detrimental Soil Disturbance (DSD)**	**Threshold Acreage (15% DSD)**	**Current Acreage in DSD**
7	646	14%	97	93	141	14%	21	20
8	564	20%	85	113	248	20%	37	50
9	489	8%	73	38	488	8%	73	38
10	382	11%	57	42	382	11%	57	42
11	507	2%	76	11	42	2%	6	1
12	334	11%	50	35	248	11%	37	26
13/14	339	8%	31	16	NA	NA	NA	NA
15	376	6%	56	21	376	6%	56	21
16	306	11%	46	34	306	11%	46	34
17	6	14%	1	1	6	14%	1	1
18	312	13%	47	42	NA	NA	NA	NA
19	137	10%	21	14	137	10%	21	14
20	209	13%	31	28	209	13%	31	28
21	285	11%	43	32	285	11%	43	32
22	97	13%	15	13	97	13%	15	13
23	385	7%	58	26	385	7%	58	26
24	203	14%	30	29	203	14%	30	29
25	87	12%	13	11	87	12%	13	11
26	455	10%	68	46	455	10%	68	46

Water quality measures from field surveys.

The macro-invertebrate counts were done using a T-walk procedure where 10 cobble size rocks within a riffle reach are examined for macro-invertebrates. Stonefly, mayfly, and caddis fly nymphs, larvae, and casings are counted.

PFC reach	pH	Temperature (F)	EC	Mayfly	Stonefly	Caddis
Corral Creek	7.65	43.5	44	5	2	4
Mason Creek 1	7.7	54.4	48	1	13	7
Mason Creek 2*	7.24	57.8	75			
Mason Creek 3	7.75	50	73	2	1	8
Porcupine Gulch	8.07	45.1	41	32	0	9
NFClearCrk1*	7.04	53.1	35			
NFClearCrk2*	7.17	41.3	42			
NFClearCrk3	7.29	41.9	24	14	4	16
NFClearCrk4	7.64	43.1	46	4	5	11
Spring Creek 1*	7.68	41.9	78			
Spring Creek 2*	7.65	41.5	73			
Spring Creek 3	7.7	41.1	69	0	3	39

*=No macro-invertebrate survey due to fine stream substrate. EC=Electrical Conductance.

APPENDIX E _____

Response to Public Comments on the DEIS

Response To Comment Report

Project: Black Mesa Vegetation Management Project (34667)

Comment Period: Formal - Draft EIS
Period Dates: 4/27/2012 - 6/10/2012

Response: The Forest Service is also concerned about road damage that logging trucks may cause. All Timber Sale contracts require that the timber purchaser either maintain the road to Forest Service standards or pay deposits to the Forest Service or counties to maintain the roads, depending on the type of road. Section 3.17 of the FEIS describes the transportation system and table 3-41 describes the expected maintenance activities for roads that would be used in any commercial harvest activity.

Comment: 1-11
I am in favor of the project, however I am concerned about damage the large trucks will do to the area road system[...]I would suggest that part of the planning and funding of this project be dedicated to the repair of road damage that will surely occur (Individual)

Response: The Forest Service appreciates the support and cooperation with the homeowners association.

Comment: 2-1

The Board of Directors for Hermit Lakes Recreation Inc., are writing in support of the proposal to remove the Spruce Beetle stricken and dead trees, and their associated fuel loads, in the Rio Grande National Forest Black Mesa Vegetation Management Project area [...]We are in support of your preferred option #2 since it provides the best option to mitigate the fire and safety danger to our members.[...]We recognize that time is of the essence in this matter, since the trees are already dead or dying and there is a serious lack of snowpack in the Rio Grande Basin this year. No entity or group of people has any more at stake in this matter than our members, both in terms of their personal safety and their property's safety. To that end, we are willing to cooperate with the USFS to the highest degree possible. We are also willing to provide reasonable access to, and through, our property for your personnel and equipment if needed. (Individual)

Response: The Forest Service also has concerns about the potential effects of large wildfires in and near this analysis area. These potential negative impacts are discussed in section 3.14 of the FEIS.

Comment: 2-2

Any large wild land fire would not only devastate this area but the negative implications for habitat, birds, animals, humans, and water quality downstream would be huge. (Individual)

Response: The Forest Service appreciates the support and cooperation with the homeowners association.

Comment: 4-1

Without any hesitation we want to express our strong support for the Black Mountain Vegetation Project Option 2. We are property owners at Hermit Lakes and live in close proximity to the proposed treatment area. Our mountain home was surrounded by spruce trees which were dying or were dead this past summer that required us to hire a private logger to remove trees and ladder fuels from the area around our home at a cost of several thousand dollars. We feel if this Black Mountain project were to be approved we would stand a chance of saving our home in the event of a fire. We are very heavily invested in our home and realize that time is of the essence. (Individual)

Response: The Forest Service also has concerns about the potential effects of large wildfires in and near this analysis area. These potential negative impacts are discussed in section 3.14 of the FEIS.

Comment: 4-2

We and the others in the valley have a great deal at stake in the safety of our homes as well as our personal safety. Also as you are well aware Hermit Lakes is part of the head waters of the Rio Grande River, and as such, a fire could be disastrous to the water supply of the river. Not to mention the devastating effect on wild life, South Clear Creek, Brown Lakes etc. For the above and many more reasons, we urge you to approve Option 2 of the Black Mountain Vegetation Project. (Individual)

Response: The Forest Service appreciates the support and cooperation with the homeowners association and your support of Alternative 2, the Proposed Action.

Comment: 5-1

We are in full support of the proposed logging mitigation plan (# 2 preferred option) as conceived. We own property at Hermit Lakes and are directly affected by the proposed plan. We know how critical it is to remove this fuel load as soon as possible and wish to express our support for any plan that would expedite the logging of this proposed area. We are available at any time to speak for this project or do whatever is necessary to help. (Individual)

Response: The Forest Service appreciates the support and cooperation with the homeowners association and your support of Alternative 2, the Proposed Action.

Comment: 6-1

I am sending this email in support of your proposal for the logging management of the Black Mesa Vegetation Management Project. I support option #2 which is your proposed preferred treatment plan. As a land owner within the treatment area, Hermit Lakes Lot #177, I am directly affected by the massive Spruce Beetle epidemic within the Rio Grande National Forest. Your proposed treatment plan would substantially increase my physical and property safety. Please contact me if there is anything I can personally do to further this project. (Individual)

Response: The Forest Service appreciates the support and cooperation with the homeowners association.

Comment: 7-1

As a representative for Hermit Lakes, I would like you to know that we are in favor of any fuel reduction/logging projects. Regardless of any roads that might need to be built, we are in favor of getting as much timber removed as possible and will gladly give access through our property. The longer we wait to get these trees out, the less they are worth and the more likely fire will devastate our property. (Individual)

Response: The Forest Service appreciates your support of the proposed action.

Comment: 8-1

Due to the intense scrutiny this activity will engender I have no doubt it has been very carefully thought out and prepared. The only way to mitigate the damage from the beetles is to put the dead and dying trees to useful purposes. It is also important to protect private land and to lessen the possibility of trees falling on people, vehicles, etc. An orderly activity, planned and prepared carefully, is the right way to proceed. I endorse alternative #2 wholeheartedly. (Individual)

Response: Thank you for your comment concerning your support for Alternative 2 of the Black Mesa Vegetation Management Project.

Comment: 9-1

I am very much in favor of alternative No 2 Proposed Action. This altemative is the best for the forest and the local economy. (Individual)

Response: The water quality data collected as part of the stream surveys for this project have been included in the FEIS in Appendix D.

Comment: 11-1

The Draft EIS includes a detailed discussion of the proper functioning condition (PFC) assessments that were performed on 19 stream reaches within three watersheds in the project area that are considered to be of concern due to past management-related disturbance. In addition to physical indicators observed during the PFC assessments, the USFS collected water quality data including pH, temperature, electrical conductance, and macro-invertebrate counts. However, these data do not appear in the Draft EIS. In addition to fulfilling the need for baseline information to measure future changes, such data are important for understanding the current condition of water quality in the project area. For this reason, we recommend that the USFS present the data, or at a minimum a summary of the data, in the Final EIS (Federal Agency/Elected Official)

Response: Map B-4 was updated for the FEIS to show mapped wetlands (NWI 2010), springs, and wells in the Black Mesa analysis area and some additional discussion was added to section 3.11, *Geology, Landform, and Soils*. Most springs in the analysis area have been developed to provide water for livestock or to provide water for other uses such as summer residences or developed recreation sites. As shown on Map B-4, most wetlands, springs, and their Water Influence Zones (WIZs) would be outside of proposed salvage units; though spring developments may need hazard tree removal measures to protect any infrastructure from damage. The few wetlands located in proximity to any salvage harvest areas would be protected by Project Design Criteria. The Black Mountain area has 3 springs in or near proposed salvage units, under Alternative 2,that have been developed for livestock watering. Recreation residences have several wells that would be protected from physical damage during any WUI thinning operations (table 2-2, Project Design Criteria, Protect Improvements page 2-8), but since all treatments in this area would likely be with chainsaws and handpiling, avoiding any impacts to the well sites is would be straight forward. The Forest does not currently have a data layer showing seep areas. Seep areas are generally identified and buffered by field crews during timber sale layout and marking.

Comment: 11-2

Despite the 100 foot setback for surface disturbing activities, indirect impacts to wetlands, such as water quality impacts, may still occur. For this reason, it is important for the public and the decision maker to understand how many wetlands, springs and seeps are present in the areas proposed for treatment under each alternative. We recommend that the Final EIS include a discussion of the presence and existing condition of such resources, including a map showing their location relative to areas proposed for treatment. (Federal Agency/Elected Official)

Response: The road system described under each action alternative was felt to be the minimum road system needed to implement each alternative under average conditions. Road densities for each alternative were analyzed (see Table 3-22 for Alternative 2 and table 3-25 for Alternative 3). As stated on pg. 3-56, 2nd paragraph, the system roads are generally well located and not likely to have deleterious effects to water yield or sediment inputs into streams. Also, as any project activities are implemented, Project Design Criteria (PDC) would be used to minimize connected disturbance to surface waters using buffers around streams, lakes and wetlands. PDC would also eliminate all heavy equipment from Water influence Zones and limit what could be done manually within these buffers. PDCs also prescribe measures to ensure that skid trails, landings, and haul roads are or would be disconnected from water sources and disturbances are both rehabilitated and mitigated to prevent future sedimentation into surface waters (see table 2-2, FEIS).

Comment: 11-4

To reduce adverse impacts to watersheds, the EPA recommends minimizing new road construction and road density, as well as locating roads to limit impacts to surface waters. (Federal Agency/Elected Official)

Response: While it was not stated directly in terms of road construction / reconstruction in relation to intermittent and perennial streams, all proposed new temporary roads (new and re- opened) were analyzed in relation to their possible effect on water quality. As stated on page 3-58, last paragraph of the FEIS, “all of the proposed new temporary roads were surveyed and found to be in stable landscape positions”. Perennial streams and intermittent streams are analyzed the same with a 200 foot buffer (100 ft. on each side of the channel). It is noted that the potential for increased sedimentation is possible and likely within the buffer as roads are decommissioned, but over the course of 3 years this would decrease to below current levels. The Record of Decision will include Project Design Criteria and monitoring measures that will be implemented as part of the project.

Comment: 11-5

While field observations of the road system were made to identify problem areas with the potential to deliver sediment to stream channels, it is not clear to what extent new or restored non-system roads may impact sediment loading to water resources. We recommend that the Final EIS discuss the location of planned road construction/reconstruction with respect to intermittent or perennial streams. We additionally recommend the Record of Decision include a commitment to monitor road reconstruction and new road activities to ensure that Design Criteria are performing as intended to protect water resources. (Federal Agency/Elected Official)

Response: Section 3.13, Air Quality of the FEIS was expanded to include discussions of criteria pollutants and visibility trends in the Weminuche Wilderness Area.

Comment: 11-6

We recommend that the Final EIS include a summary table indicating the current background concentrations of all criteria pollutants. This will provide a more complete current air quality baseline in the project area for comparison to anticipated impacts. In addition, because visibility is a protected air quality related value (AQRV) in mandatory Class I Federal areas, we recommend that the Final EIS include a graph showing visibility trends in the Weminuche Wilderness Area over the past several years. (Federal Agency/Elected Official)

Response: Section 3.13, Air Quality of the FEIS was expanded to include a qualitative discussion of pollutants resulting from activities for each action alternative and potential effects on local air quality.

Comment: 11-7

The Draft EIS discusses several project activities that could impact air quality including vehicle emissions from logging equipment, dust from travel on unpaved roads and burning of slash piles. The Draft EIS does not include information on what pollutants would be emitted, in what quantities, and how those emissions may impact air quality and AQRVs. We recommend that the Final EIS include a qualitative discussion of criteria pollutants anticipated to be emitted by project activities and how the emissions are predicted to impact air quality and AQRVs in the project area including the Weminuche Wilderness Area and town of Creede (Federal Agency/Elected Official)

Response: Dust abatement details, including methods, frequency, timing, and triggers for application would be prescribed and set forth as part of the individual timber sale contracts which will include chemicals to be used and application locations. FSR 520 is a known concern due to the amount of visitor traffic it receives. Hinsdale County has also planned to apply dust abatement to FSR 520, so a dust abatement schedule/plan would be developed in conjunction with the County. Other open roads are used more by those with summer residences or other local visitors. Through no concerns were raised regarding dust and use on other roads, as logging operations proceed, if dust becomes a concern, dust abatement could be added to other contracts.

Comment: 11-8

The Draft EIS indicates that dust abatement would be required on portions of FSR 520 if logging occurs during the summertime, but gives no detail on how dust abatement would be accomplished. We recommend that the Final EIS include a detailed dust control plan including control methods, frequency and/or triggers for application, and expanded to include other project area roads and logging areas which may also warrant dust abatement. (Federal Agency/Elected Official)

Response: The FEIS, section 3.6, contains a summary of the potential short and long-term effects of all the project alternatives, including No Action, on Threatened and Region 2 designated Sensitive species, Management Indicator Species, Migratory Birds, and also General Wildlife found in the analysis area. Section 3.7 discusses the potential impacts of the project alternatives on fisheries resources. Collectively, the discussion of these alternatives evaluates the effects of human activities, changes in cover, habitat security, and wildlife movement on the landscape. The Wildlife Report (project record) specifically analyzes the direct and indirect potential response of TES species by salvage sales and species viability. The more detailed analysis of potential effects is included in the project Wildlife Report, Biological Assessment, and Biological Evaluations which will become part of the Project Record when an alternative is selected.

Comment: 12-1

As we wrote previously in our scoping comments- we remain concerned regarding both the short and long-term effects of this project upon forest wildlife – especially Canada lynx, pine marten, boreal owl, and Rio Grande cutthroat trout – all species of great concern.[…]The DEIS presents inadequate data regarding how wildlife respond to salvage sales- and how viable populations of species already at risk will be maintained.[…]There needs to be a real analysis here – not just statements that numbers are met. The effects of human disturbance, loss of cover and habitat security, and loss of movement corridors need more discussion.[…]The same concern extends to other species of concern – like migratory birds, pine marten, raptors, etc. There needs to be more analysis of how years of harvest, roads, disturbance by machinery and people, etc. will displace these species. (Environmental Conservation/ Preservation)

Response: As described in section 3.12, removal of timber from the area would have some adverse effects as compared to no action. Soils could dry out to some extent and some nutrients would be lost as biomass is removed, though dead trees less than 8 inches dbh and additional larger trees designated specifically for snags, along with other tree species would remain on site. Forest Plan standards and guidelines have established the minimum tons per acre of coarse woody debris requirements which have been determined by research to allow for adequate nutrient retention. In addition, if needed, fine woody debris would be added to bare soils to maintain soil cover, reducing drying and erosion. Overall biodiversity is somewhat limited by the species of plants and animals adapted to live in this climate. Grasses, forbs, and shrubs are expected to increase as the overstory trees die due to increasing light and available moisture. Removal of dead biomass may help increase available light, at least in the short term, in the harvested areas. Compaction is addressed by Project Design Criteria (PDC) that would require the re-use of existing skid trails and landings, to the extent possible, and require rehabilitation of areas which exceed forest detrimental disturbance standards.

Comment: 12-3

The effects of such large volume of trees removed upon the Rio Grande Watershed need more analysis and disclosure. There is a huge negative from erosion, compaction, drying of soils, and loss of biodiversity and soil nutrients from removing large snags that would fall and become soil nutrients and habitat as they decompose. (Environmental Conservation/ Preservation)

Response: As stated in various sections of the 2010 Forest Plan Monitoring and Evaluation (M&E) Report, project-level monitoring by Forest specialists has indicated that Forest Plan Standard and Guidelines and Project Design Criteria have proven effective at protecting streams, soil health, and biodiversity (pg. 6, first paragraph; pg. 7, 2nd paragraph; pg. 14, 3rd paragraph). The M&E report appendix under Soil Productivity (1), page 60, indicated that monitoring in the Burro Blowout Timber Sale confirmed that Forest Plan Standards and assessments are working and no changes are being recommended. In the same Appendix (pages 62 and 63) under "assess silvicultural objectives during pre-sale, harvesting, and post-sale review", lists the timber sales that have been reviewed and states that objectives outlined in the silvicultural prescriptions (which include relevant Project Design Criteria) were being implemented and meeting objectives. Additional monitoring is ongoing to assess residual live trees per acre, snag numbers, and CWD as each timber sale project progresses. Forest Plan Monitoring Reports are available for review on the Forest web page at: http://www.fs.usda.gov/projects/riogrande/landmanagement/projects on the right side of the page under "Highlights".

Comment: 12-4

This creates a significant adverse effect because such a large area will be treated- mitigation is not adequate to protect our Rio Grande headwaters area (here). Mitigation is no substitute for protection and has failed in past sales we have monitored in the area (especially at such high altitude areas). The DEIS fails to disclose 1) how effective past mitigation has been in salvage sales nearby, 2) what monitoring was done (as required) to assess how mitigation was effective, and 3) what failure of mitigation will result in for forest resources here. (Environmental Conservation/ Preservation)

Response: Alternative 2 was developed to meet the Purpose and Need for the project, part of which was to provide commercial forest products to the timber industry from lands designated for that purpose under the Forest Plan. Chapter 3 of the FEIS describes the projected environmental and social effects for the range of alternatives, along with the miles of existing and temporary roads that would be needed to implement harvest activities. The Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 12-5

The preferred alternative (2) would create the largest miles of road system, and remove the largest number of trees; Why does the Forest Service propose an alternative that will have the greatest negative effect upon numerous resources of concern? There is no justification or clear rationale (as required by NEPA) for choosing alternative 2. Only to provide forest products to the timber industry is given as a goal of this alternative and we recommend a further examination of alternative 3 with modifications to further protect Canada lynx.[…]By treating fewer acres – impacts to lynx and other species of concern will be lessened; also fewer impacts to soils and more chance that forest regeneration will occur. (Environmental Conservation/ Preservation)

Response: The amount of timber harvest in each action alternative meets the purpose and need for the project. The Responsible Official may determine what level of action will be implemented within the analyzed range of alternatives, including no action. The distinction between this analysis and the amount of timber offered within a specific timber sale should be made. The estimated volume would not be offered in one timber sale, but likely through a series of sales over several years (see section 1.7, FEIS). Providing a large volume would allow mills and timber purchasers in the San Luis Valley and adjacent areas to effectively compete and remain in business through the depressed timber market, by providing raw material with relatively low mobilization operational cost (see FEIS, section 3.15).

Comment: 12-6

There is no way a project of this size, especially under alternative 2 can be conducted (and monitored) in approximately 5 years (2013 -2017 or 2018) as the DEIS proposes. Thus – the long and short term impacts of this will be for greater than described for one thing. There are not enough local wood products companies to even handle such large volume of trees. (Environmental Conservation/ Preservation)

Response: Section 3.6, the full Wildlife Report, draft Biological Assessment and Biological Evaluation all address potential disturbances to wildlife species including lynx, in both the short and long term. Each alternative was analyzed to determine the potential positive and negative disturbance impacts, including the possibility that the project would take several years to complete all activities. Activities would not be occurring simultaneously on all acres selected for salvage harvest; disturbances would be staggered across the area. Both action alternatives would be in full compliance with the Endangered Species Act and are consistent with the effects described in the programmatic biological opinion prepared for the Southern Rockies Lynx Amendment.

Comment: 12-7

Also, weather and other factors mean this will be under disturbance for at least 10 years – effectively driving Canada lynx, boreal owl, and other species out of the area, for a species such as lynx- this will decimate this population, as no breeding can occur. Recovery will be set back significantly for lynx and this violates the ESA, and is avoidable by designating an alternative that reduces negative impacts, and minimizes disturbance. (Environmental Conservation/ Preservation)

Response: The Forest Service uses many measures to reduce or prevent negative impacts (disturbances) to the environment, including wildlife and watersheds, in the planning and implementation of management activities. The Forest Plan Standards and Guidelines and Best Management Practices, incorporated into the R2 Watershed Conservation Practices Handbook, are the first protection measures to be applied to a project. Other more specific Project Design Criteria were identified and included, as needed, in section 2.4, table 2-2, of the FEIS. The Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 12-8

Rather than maximize timber harvest – the DEIS needs to focus much more upon minimizing disturbance to wildlife, and minimizing disturbance to this watershed. We fail to see another action alternative that does this. (Environmental Conservation/ Preservation)

Response: Under section 3.5 Forest Management, page 3-17 (FEIS), 2nd paragraph, states "with the exception of minor amounts of blowdown salvage, no future timber harvests are anticipated in the foreseeable future". Of the six watersheds evaluated as part of this project analysis area (see table 3-17), the majority of the acres designated for potentially active management or use under the Forest Plan are included in the analysis area boundary, other acres in the watersheds are generally wilderness, backcountry, or research natural areas. Section 3.16 Recreation and Travel Management lists the current developed recreation sites (table 3-35) and special uses (table 3-36) in the analysis area. There are no reasonably foreseeable plans for new developed recreation sites or structures and no new proposals for additional outfitter guiding permits. The extent of salvage and hazard tree removal on private land is difficult to determine, but if the land has structures and dead Engelmann spruce, tree removal can reasonably be expected and this was considered in the wildlife effects analysis.

Comment: 12-9

Also under cumulative effects we fail to see in the DEIS any discussion of future impacts; there is a slight mention of private land treatments possible in the future. However, no mention of possible timber sales, salvage sales, recreation projects, and other actions on forest service lands nearby. This violates NEPA, and the DEIS must address this issue (Environmental Conservation/ Preservation)

Response: Monitoring Measures are fully described in section 2.6 of the FEIS. Several of the items listed are required as part of the Timber Sale (or other contract) contract preparation process to ensure that sale layout incorporates the relevant Project Design Criteria and the needed contract clauses are included prior to contract advertisement and award. Other monitoring items are completed during and following harvest activities. Since the harvest activities are projected to occur over several years, monitoring would be periodic and planned for in the Forest's annual program of work. Staffing levels are expected to be adequate to meet any monitoring requirements specified in the FEIS and Record of Decision.

Comment: 12-10

With Forest Service budget cuts and likely future budget restrictions – how will monitoring be conducted? We don't see how this District can possibly monitor a sale of this size in a full and effective manner. Promises on paper are not adequate – the DEIS needs to address staffing and budget realities, and clearly disclose a monitoring plan (how many acres staff can monitor per year, what data will be gathered, what resources will be monitored, etc.) (Environmental Conservation/ Preservation)

Response: The RGNF has been working with the Fish & Wildlife Service (FWS) on developing a clear strategy for lynx habitat conservation in the project area, as part of an Informal Consultation process, throughout the development of this project. For lynx, the "Determinations" stated on pages 3-19 and 3-23 (FEIS) are considered draft based on the consistency of the proposed alternatives with the Biological Opinion, signed in 2008 as part of the SRLA (Southern Rockies Lynx Amendment), and the on-going Informal Consultation process. Formal consultation with FWS occurs when the Responsible Official determines a course of action and a Decision is made regarding the selected alternative. The exemptions and exceptions allowed for in the SRLA considered lynx habitat needs at a multi-forest landscape scale; Tables 3-6 through 3-8 clearly display how each alternative meets these exemptions and exceptions and discusses and discloses the current habitat baseline at the smaller habitat scales of the Forest and Lynx Analysis Unit. Pages 3-17 to 3-26 of the FEIS summarize the key points of the effects analysis for the range of alternatives considered on lynx and their habitat. When the Selected Alternative is determined, the Wildlife Report and Biological Assessment will be finalized and made part of the Project Record.

Comment: 12-11

The DEIS gives no explanation of U.S. Fish and Wildlife determination or Forest Service determination of lynx impacts. It merely states that the alternative 2 and 3 will meet "exemptions and exceptions on an LAU. This is not acceptable under the ESA. There is no discussion or disclosure of how these exemptions "will affect lynx across the landscape, how many have already been granted and how managing by "exemption and exception" is going to protect and recover this endangered species. (Environmental Conservation/ Preservation)

Response: It is unlikely that approved salvage units in the analysis area will be harvested at the same time. In actuality, it is likely that only small portions of the analysis area would be harvested at one time with roads being re-opened and closed as each sale progress. This progression of work would help provide for areas of security for wildlife as other areas are being harvested. As shown in table 2-4, Comparison of Alternatives, of the approximately 32,000 acres of forest cover in the analysis area, both action alternatives would not propose any salvage harvest on between 73 and 82 percent of these acres, which would leave undisturbed areas for wildlife use and dispersal. This was considered in the wildlife effects analysis. Project Design Criteria were also included to minimize logging activity disturbance between May 1 and July 1st, to allow wildlife species to complete critical reproduction periods. It was also acknowledged that there could be displacement of individuals (table 2-4, Wildlife). However, since existing gates would remain closed during harvest operations, this would continue to limited disturbance in much of the analysis area in any given period of time.

Comment: 12-12

Where will species displace to, how intact is this habitat, are there adequate movement corridors, etc.? The DEIS just ignores this vital concern and violates NEPA by doing so. (Environmental Conservation/ Preservation)

Response: Key Issue #2 (section 1.10, page 10) and its associated measurement indicators were developed to address concerns about the effects of salvage activities on wildlife habitat, including forest fragmentation and habitat quality. This issue resulted in the development of Alternative 3 that was designed, in part, by considering which areas could be harvested if the miles of gated or temporary roads needed/used were reduced. There is no system road construction planned under any alternative. As mentioned elsewhere, only small portions of the analysis area would likely be harvested at one time with roads being re-opened and closed as the sales progress. This progression of work will help provide for areas of security for wildlife as other areas are being harvested.

Comment: 12-13

I've failed to see analysis of forest fragmentation from this project – in particular the impacts of miles of road network re-opened and constructed for this project. It will result in over 10 years of roads in this area and the DEIS fails to disclose how this and the harvest of millions of board feet of timber will fragment forest species sensitive to this disturbance. (Environmental Conservation/ Preservation)

Response: The NEPA process is designed to give a “hard look” at impacts of proposed actions. A variety of wildlife species and the watersheds associated with these actions have been analyzed for the effects (direct, indirect, and cumulative) associated with project activities. Every effort is made to look critically at the potential impacts upon wildlife and the involved watersheds and how harvest activities would affect these resources as a whole. The EIS is a summary of information from larger and generally more extensive specialist reports. The wildlife and hydrological specialist reports contain more detailed and complete looks at the expected effects associated with proposed activities.

Comment: 12-14

Conduct a more thorough analysis, giving a real “hard look” at impacts from this action, especially to wildlife and watersheds. (Environmental Conservation/ Preservation)

Response: Chapter 3 of the FEIS analyzed and disclosed the expected resource effects of salvage harvest and other activities from No Action through the largest number of acres proposed for salvage harvest under Alternative 2. All action alternatives evaluated include Project Design Criteria and/or mitigation measures that have proven effective for limiting adverse effects from these types of management activities, though it is acknowledged and disclosed that some effects would occur under all alternatives. Most unavoidable negative effects are expected to be minor and relatively short-term (See FEIS, sections 3.6, 3.11, and 3.12). The Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 12-15

Develop another alternative that treats far fewer acres, has less impacts, is easier to monitor, and will not create such huge impacts, openings, drying of soils, erosion, roads, and other negative effects. (Environmental Conservation/ Preservation)

Response: The Forest Service appreciates your support of the proposed action.

Comment: 13-1

We are property owners at Hermit Lakes and live in close proximity to the proposed treatment area. Our mountain home was surrounded by spruce trees which were dying or were dead this past summer that required us to hire a private logger to remove trees and ladder fuels from the area around our home at a cost of several thousand dollars. We feel if this Black Mountain project were to be approved we would stand a chance of saving our home in the event of a fire. We are very heavily invested in our home and realize that time is of the essence in this matter since thousands of trees are either dead or in the process of dying . (Individual)

Response: The Forest Service also has concerns about the potential effects of large wildfires in and near this analysis area. These negative impacts are discussed in the effects section of the fuels section of the FEIS.

Comment: 13-2

We and the others in the valley have a great deal at stake in the safety of our homes as well as our personal safety. Also, as you are well aware, Hermit Lakes is part of the head waters of the Rio Grande River, and as such, a fire could be disastrous to the water supply of the river. It would also destroy the summer range for a great many game animals as well as birds and other smaller animals. (Individual)

Response: The distinction between this analysis and the amount of timber offered within a specific timber sale should be made. The estimated volume analyzed would not be offered within one sale, but through a series of sales over several years (section 1.7). Providing large volume would allow mills and timber purchasers in the San Luis Valley and adjacent areas to effectively compete and remain in business through the depressed timber market by providing raw material with relatively low mobilization operational cost (section 3.15). The Forest Service agrees with the commenter that some of the dead trees will eventually become unsuitable for dimensional lumber due to defect and checking. Products not utilized for dimensional lumber are currently being utilized for firewood, house logs and other products. Intermountain Resources was recently (09/2012) purchased by another company and is now Montrose Forest Products. The mill is currently operational and is buying timber.

Comment: 14-1

Under the proposed action (alternative 2), up to 60 million board feet would be offered for sale. Note that the project is intended to make wood available:[...]DEIS at 3-14. (See also id. at 4.) But it is hard to imagine how this amount of wood could ever be sold in a reasonable period of time, say while the trees to be cut are still millable into dimension lumber. While the beetle-killed spruce trees will likely remain standing for some time, they will develop checks and splits, and suffer other forms of decay, that will soon make the trees unsuitable for milling into dimension lumber such as 2 X 4s.[...]This has led to more sales being awarded to smaller outfits. Ibid. But these mills could not possibly utilize anywhere near 60 million board feet in the next 10 years, the time period said to be how long the project would take to implement. DEIS at 3-89.[…]It does not make sense to approve a huge sale of wood from the area in hopes that the economy will soon change, as there is little indication of a major improvement in the foreseeable future. Even if the economy did improve, NEPA might have to be redone for the project, as under guidance from the Council on Environmental Quality, NEPA for approved but unimplemented projects is considered stale after five years. (Environmental Conservation/ Preservation)

Response: The commenter is correct that removing large areas of dead spruce may create large openings where is existing regeneration is lacking. However, the Forest Service disagrees that most large areas cut would resemble clearcuts. The definition of a clearcut is "an even-aged regeneration or harvest method that removes all trees in the stand producing a fully exposed microclimate for the development of a new age class in one entry" (Forest Service Activity Tracking System (FACTS) Business Rules). All green trees, aspen, subalpine fir, and un-infested spruce trees along with a majority of the existing advanced regeneration would be left un-cut and protected from damage, as stated in the Project Design Criteria in section 2.4. table 3.5 shows most stands have substantial existing advance regeneration. Stand-specific silvicultural prescriptions on each harvest unit will be completed following the determination of the Selected Alternative. Based on stand exam data and initial silvicultural diagnoses, due to existing advanced regeneration, most harvests would be termed a Shelterwood Removal Cut with Reserve Trees (FACTS code 4145- a final removal cut that releases established regeneration from competition with the over-wood after it is no longer needed for shelter under the shelterwood regeneration method). Regardless of the type of regeneration harvest coded, the causal agent is spruce beetle activity.

Comment: 14-2

Another reason to not implement the proposed action is that removal of large areas of spruce trees infested with, or already killed by, bark beetles would essentially create large clearcuts. DEIS Table 3-5 on page 3-13 shows that bark beetle infestation is 90-100 percent in every proposed treatment area. See also Id. at 3-20. Three such units are 100 percent spruce, while all but one of the remaining units is at least 70 percent spruce, with most having 80 percent or more spruce. Id at 3-13. Under the proposed action, "[m]erchantable trees 8 inches diameter breast height (dbh) and larger would be considered for harvest". DEIS at 2-2. Thus virtually all trees in some stands could be cut, since only six snags per acre would have to be retained. Id. at 2-10. The cut is termed the "final removal" and a "type of regeneration harvest". Id. at 8. (Environmental Conservation/ Preservation)

Response: Section 3.6 contains a summary of the potential short and long-term effects of the project upon various wildlife species including Threatened, Endangered and Region 2 designated Sensitive species, Management Indicator Species, Migratory Birds and General Wildlife found on the Forest. A more thorough analysis of potential effects is included in the project Wildlife Report. As part of the project design criteria (PDC), limbs and tops will be returned to the unit if 15% or more of the unit has exposed soils. This slash will also be used on skid trails and landings to help reduce erosion and increase soil water retention. Additionally, PDCs also require the use of old skid trails and landings where possible, thus limiting the amount of new disturbance as harvest activities occur. The effects of past and proposed project activities on soils are fully disclosed in section 3.12 of the FEIS. Heavy equipment will cause damage to soils which will be mitigated by the above discussed actions as well as subsoiling, as necessary, to rehabilitate new and existing detrimentally disturbed areas to be within forest plan standards (FEIS pg. 3-69).

Comment: 14-3

The resulting landscape would have reduced habitat for various wildlife species and less ability to trap and retain moisture, especially snow. The use of heavy equipment over a large area increases the damage to soils. (Environmental Conservation/ Preservation)

Response: While it is expected that some advanced regeneration would be damaged during harvest operations, the majority of advanced regeneration would not be damaged. Table 2.2, Project Design Criteria, lists several actions to reduce impacts to any advance regeneration including: skid trails will be located and approved in advance of felling, utilize existing skid trails where possible, place landings in open areas, maintain skid trails at least 100 feet apart, and retain patches of over-story trees within dense understory. These Project Design Criteria were developed to protect advanced regeneration. Most harvesting operations now use mechanical harvesters that can directionally fell trees away from advanced regeneration which further minimizes damage.

Comment: 14-4

Cutting and removing dead trees is also likely to destroy much of the advance regeneration. Note that every proposed unit has a substantial number (200 to 2000) of trees per acre of “current regeneration”. DEIS at 3-13. Felling and skidding the overstory trees is likely to damage and destroy a considerable percentage of this regeneration. (Environmental Conservation/ Preservation)

Response: Most of the proposed salvage activities would not be seen from Concern Routes (FEIS, section 3.18, pg. 3-97 and 3-98) since much of the existing road system is closed to motorized travel. As stated on pg. 3-107, all alternatives would meet the goals, objectives, and standards outlined in the Forest Plan. Areas where management activities could be seen would meet their scenic integrity objectives, if not immediately upon project completion, then within 5 to 25 years, depending on the level of mortality, the amount of residual understory, and potential aspen regeneration. Project Design Criteria relating to visible stump heights would help maintain scenic quality when hazard trees are removed in the vicinity of Concern Routes and Highway 149.

Comment: 14-5

Removing most or all of the trees from large areas would not allow the scenic integrity objectives (SIOs) for the project area to be met. (Environmental Conservation/ Preservation)

Response: Based on the analysis completed for the FEIS, public comments, and other criterion, the Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 14-6

If either of the DEIS' action alternatives is approved, something we do not recommend, much more area must remain unlogged than is currently proposed in order to conserve existing regeneration, wildlife habitat, scenery, and other resources.

Given the economic realities as well as effects to resources, the Forest Service should analyze and approve a much smaller project in the Black Mesa area.[…]Given the economic conditions and the likely effects from either action alternative, a much smaller project is mandated. The DEIS must at least consider one such alternative, one that does not treat the areas removed from alternative 2 to compose alternative 3, and concentrates on removing hazard trees. (Environmental Conservation/ Preservation)

Response: An analysis of the potential impacts on lynx and lynx habitat is included in section 3.6 of the FEIS along with the project Wildlife Report and the Biological Assessment which will be submitted to the US Fish and Wildlife Service when the Responsible Official determines a course of action. Projects effecting lynx habitat are evaluated at the Lynx Analysis Unit scale and projects follow the standards and guidelines in the Southern Rockies Lynx Amendment (2008).

Comment: 14-7

Currently, the project area has lynx habitat, even though the overstory spruce are dead or dying. There is also an understory in every proposed treatment unit, with some of these likely having dense understories. See DEIS at 3-13. The overstory trees will likely remain standing for some time, providing cover for lynx, who can hunt hare in the understories.

Removing the overstory would remove the needed cover, converting the habitat to unsuitable. See DEIS at 3-20. Once the overstory is removed, it will be many decades before the treated area is suitable lynx habitat. The trees removed would not become future denning habitat, as would otherwise occur if they were allowed to naturally fall to the ground. Also, there would be some damage to the understory as the result of such operations, assumed to be 30 percent at DEIS p. 3-20. (Environmental Conservation/ Preservation)

Response: The amount of acres in Alternative 2 and 3 which may result in converting suitable habitat into a Stand Initiation Structural Stage (i.e. temporarily unsuitable habitat) were calculated correctly. However, the 436 acres of fuels treatments adjacent to private lands were mistakenly omitted from the calculations and those acres are now included as contributing to the amount of habitat being converted to temporarily unsuitable. Conversion of suitable habitat into a Stand Initiation Structural Stage (SISS) is dependent upon the amount of understory regeneration present, the amount of dense horizontal cover present, the species of trees in the unit, and the amount of overstory spruce impacted by beetles. In several cases, units currently lacked a well-developed understory. These units do not provide dense horizontal cover and are currently at a SISS and are part of the Lynx Analysis Unit SISS baseline and included within Standard Veg S1. The Black Mesa Project meets all of the standards and guidelines, including Standard Veg S2, in the Southern Rockies Lynx Amendment.

Comment: 14-8

Given that stands are dominated by spruce and that all dead and dying trees eight inches or greater in diameter would likely be cut (see DEIS at 3-13 and section I above) over 9,410 acres (id. at 2-1), the amount of lynx habitat converted to unsuitable would be much greater than the 721 acres shown in the DEIS. Id. at 3-21. The conversion to unsuitable habitat needs to be recalculated to ensure that less than 15 percent of lynx habitat would be converted to unsuitable via logging in a 10-year period, as required by Standard Veg S2 in the Southern Rockies Lynx Management Direction. (Environmental Conservation/ Preservation)

Response: The Black Mesa action alternatives would increase the amount of temporarily unsuitable lynx habitat in the Lynx Analysis Units, but would not result in destruction of habitat. We agree that field work completed by Wildlife Biologists and Technicians identified areas of highest value to wildlife (including lynx). That information was utilized to develop Alternative 3, by reducing the size of the project, retaining sizable areas of overstory with moderately dense understory and by maintaining security and travel corridors to varying degrees per alternative. The Forest Service uses many measures to reduce or prevent negative impacts (disturbances) to the environment (including lynx) in the planning and implementation of management activities. Specific Project Design Criteria, including measures regarding lynx and CWD, are included in section 2.4. Based on the analysis completed for the EIS, public comments, and other criterion, the Responsible Official may choose to implement any of the action alternatives, no action, or some combination of the analyzed alternatives.

Comment: 14-9

Damage and destruction of lynx habitat must be minimized. The best way to do that is to: a) have a much smaller project; and b) retain sizable areas of overstory with moderately dense understory, both between and within treatment units. Large open areas are known to be detrimental to lynx. See, e. g., Ruediger et al, 2000, at 7, 19. Retaining sizable areas (not just small islands) would help reduce the fragmentation of lynx habitat. It is especially important to retain, uncut, the acres removed from alternative 2 to form alternative 3, as they have been identified to be of highest value to wildlife as determined by field surveys completed by the ID Team Wildlife Biologist and Wildlife Field Technicians.

DEIS at 3-22. These areas have security and travel cover and the highest quality dense horizontal cover. Ibid. It also includes acreage that has no road access, so habitat effectiveness for lynx and other species would be retained if these areas are not treated. Ibid. Finally, the integrity of west-to-east wildlife movement corridors across Highway 149 would be protected. Ibid.

It is important to leave coarse woody debris (CWD). Lynx use piles of logs for denning. Since trees that would otherwise fall to the ground and become piles will instead be logged under the action alternatives. Such material also provides habitat for other species like marten and slowly forms new soil. Thus it is very important that adequate CWD be retained. We recommend that any existing CWD be retained. (Environmental Conservation/ Preservation)

Response: Table 3-32, in section 3.14, was somewhat confusing, but the average surface fuel loading for the years 2013, 2033, and 2063 was the amount that was projected to remain within the stands following harvest. The average amount of greater than 3 inch fuel removed in 2013 is in addition to the existing average surface fuel load (biomass removed in the harvest). By removing standing dead fuel, average surface fuel loading in 2033 and 2063 would be substantially reduced in treated acres compared to the no action alternative (Alternative 1). In 2033, Alternative 1 showed an average surface fuel loading of 55 tons/acre versus Alternative 2, which showed an average surface fuel loading of 33 tons/acre. In 2063, Alternative 1 showed an average surface fuel loading of 48 tons/acre versus Alternative 2 which showed an average surface fuel loading of 27 tons/acre. The amount of coarse woody debris (CWD) was expected to exceed the Forest Plan minimum standard in both Alternatives 2 and 3. Table 3-32 was updated for the FEIS to provide additional clarity.

Comment: 14-10

A Forest Plan standard requires retention of 10-15 tons per acre in spruce-fir stands. Plan at III-13. However, the project DEIS states that under alternative 2, 33 tons per acre of fuel greater than three inches in diameter would be removed, out of 35 tons expected to be present. Id. at 3-75. This would not leave sufficient CWD for lynx or other ecological functions. We recommend retaining the amount required by the Forest Plan, and that a good portion of it should be in larger diameter pieces. All existing CWD should be retained, if possible. (Environmental Conservation/ Preservation)

Response: Section 3.6 contains a summary of the potential effects of the proposed project on lynx and other species of wildlife. A more thorough analysis of potential effects, including cumulative effects, is included in the project Wildlife Report and Biological Assessment. As directed by the Southern Rockies Lynx Amendment, Lynx Analysis Units (LAUs) are utilized Forest-wide to track past, proposed and foreseeable future projects to compare potential impacts as defined by the standards, guidelines, exemptions, and exceptions contained within the Southern Rockies Lynx Amendment. The Forest Service agrees that protecting lynx habitat would also help protect habitat for marten. Section 3.6 contains a brief summary of the potential short and long-term effects of the project on marten. The Wildlife Report contains a much more thorough analysis of the potential effects on marten and specifically addresses those Conservation Measures which specifically apply to marten.

Comment: 14-11

Effects to lynx need to be considered on the landscape scale, especially since bark beetle mortality is occurring over large areas, and projects to remove such trees over large areas are proposed as well. In addition to Black Mesa, these projects include: Big Moose, County and Line, and Cumbres, plus a number of smaller projects. We do not find this analysis in the DEIS.[...]Protecting lynx habitat would also help protect habitat for marten, as that species requires overhead cover and down dead wood for nesting and winter foraging. (Environmental Conservation/ Preservation)

Response: The range of alternatives and management options that could be considered has been effectively limited by the extensive tree mortality resulting from the spruce beetle epidemic. However, it is felt that an adequate range of alternatives was analyzed to meet the purpose and need for this project (FEIS, section 1.4) and address the key issues identified for this project (FEIS, section 1.10). The range of alternatives considered is described in sections 2.2 - Alternatives Considered in Detail and section 2.3 Alternatives Considered but Eliminated from Detailed Study. Collectively, these represent a reasonable range of management options and therefore comply with NEPA direction.

Comment: 14-12

THE EIS' RANGE OF ALTERNATIVES IS INADEQUATE. Under the Council on Environmental Quality regulations implementing the National Environmental Policy Act, "agencies shall…rigorously explore and objectively evaluate all reasonable alternatives". 40 CFR 1502.14(a). (Environmental Conservation/ Preservation)

Response: The amount of timber harvest in each action alternative meets the purpose and need for the project. The Responsible Official may determine what level of action will be implemented within the analyzed range of alternatives, including no action. The distinction between this analysis and the amount of timber offered within a specific timber sale should be made. The estimated volume would not be offered in one timber sale, but likely through a series of sales over several years (see section 1.7, FEIS). Providing a large volume would allow mills and timber purchasers in the San Luis Valley and adjacent areas to effectively compete and remain in business through the depressed timber market, by providing raw material with relatively low mobilization operational cost (see section 3.15).

Comment: 14-13

The two action alternatives in the DEIS would cut 9410 and 6587 acres, producing 50-60 and 35-45 million board feet, respectively. Given that it is highly unlikely that anywhere near all of these acres could be cut in the near future, given current conditions (see section I above), alternatives with smaller acreages and amounts of logging are reasonable and must be analyzed in the EIS. (Environmental Conservation/ Preservation)

Response: The alternatives evaluated ranged from No Action through Alternative 2, which represented the maximum salvage harvest acres. Due to the high priority of the situation, each action alternative included the need to remove hazard trees to protect extensive existing infrastructure present in this analysis area and address public and employee safety concerns in high use areas. As displayed in Table 2-4, acres of Engelmann spruce stands in the analysis area not harvested and becoming dominated by dead trees would range from about 20,949 acres down to about 13.581 acres, indicating that large acreages of dead trees would remain. As stated in the FEIS, it would meet desired conditions to have aspen regenerate naturally in many areas, but where aspen regeneration is insufficient in harvested units, Engelmann spruce would be planted in order to accelerate the rate of stand recovery and meet desired stocking levels. Based on the analysis completed for the FEIS, public comments, and other criterion, the Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 14-14

A smaller alternative should: 1) concentrate on removing hazard trees from areas near roads, power lines, and other infrastructure; 2) retain sizable areas of dead trees, especially where there is dense regeneration; 3) not cut the areas removed from alternative to 2 to design alternative 3 ; and 4) allow aspen to expand naturally. Such an alternative would, at least to some degree, meet the objectives listed for the project. See DEIS at 4. (Environmental Conservation/ Preservation)

Response: Forest-wide Desired Conditions for Soils (Forest Plan pg. I-3) states “Soils may be periodically disturbed by management activities, but are restored and reclaimed to original potentials after activities have been completed”. In past timber harvests, design criteria did not follow the same guidelines as they do now. Some areas were impacted to exceed the 15% limit that is now in the Forest Plan. The requirement that units be brought under the 15% limit after harvest activities are completed provides an opportunity to accomplish our multiple forest objectives - timber harvest as well as soil protection and improvement. PDC are in place to minimize additional disturbance by re -using existing skid trails, landings, and/or temporary roads to the extent feasible. As shown in table 3-23 for Alternative 2, total watershed disturbance for each 6th level HUC are well below concern levels.

Comment: 14-15

BOTH ACTION ALTERNATIVES WOULD TREAT AREAS ALREADY HAVING A HIGH DEGREE OF SOIL AND WATERSHED DISTURBANCE.[...]The 15 percent standard was adopted in the Rio Grande Forest Plan:

Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15% of any land unit (FSH 2509.18).

Forest Plan at III-10, Soil Productivity Standard 1. (Environmental Conservation/ Preservation)

Response: See previous responses related to soil disturbance. As indicated in the FEIS (pg. 3-45, 3rd paragraph), the 15 percent watershed equivalent roaded area is not a forest standard or guideline, but a concern level that signals a need for careful field investigations and concentrated analysis effort to ensure that stream health has not been reduced. The 7th level HUCs with higher past disturbance were the concentration for field reviews. Field reviews indicated that stream reaches were robust and do not currently show any negative effects of past logging and proposed activities would not likely create negative effects to the streams (FEIS, 3-58). Project Design Criteria and any timber sale or contracts would require BMPs to be addressed before the harvest completion. This ensures that Project Design Criteria and BMP requirements will be implemented before harvest activities begin, and monitoring is done to ensure that they are implemented correctly at the conclusion of harvest activities. Salvage harvest potentially has more impact on a unit than traditional thinning-type harvests, as more trees per acre would be cut and removed. Under proper conditions and with proper equipment, heavy equipment can move in a limited way across the landscape and, while causing some disturbance, it is not considered detrimental.

Comment: 14-16

THE PROPOSED ACTION ALTERNATIVE WOULD AUTHORIZE DETRIMENTAL ACTIVITY IN AREAS ALREADY EXCEEDING STANDARDS. Detrimental soil disturbance already exceeds 15 percent in three units. DEIS at 3-63, 3-64. If alternative 2 was implemented, disturbance in all three 7th-level watersheds of concern would increase. Two of them are already over 15 percent disturbed, and one would be just under the 15 percent standard. DEIS at 3-57.

For alternative 3, disturbance in the 7th-level watershed of concern that is already over 15 percent would increase, and one watershed would come close to reaching the 15 percent standard. Id.at 3-58, 3-59.

Note that "[t]he detrimental soil disturbance estimates assume that BMPs would be implemented and that soil recovery would occur over time". DEIS at 3-63.

The disturbance figures cited above include those for watersheds, in which "the proposed salvage treatment acres would be heavily disturbed by skid trails and other harvest activities". DEIS at 3-56. (Environmental Conservation/ Preservation)

Response: Project design criteria are used to protect resources and mitigate adverse effects from harvest activities. Monitoring of these criteria is done to ensure that they are effective; monitoring would be done on a regular basis during and after project activities (see section 2.6), as documented in the annual Forest Plan Monitoring and Evaluation reports. Subsoiling, using a winged subsoiler, was found to be up to 75 to 80 percent effective in breaking up compacted layers (Kees 2006). Continued monitoring by Forest timber and resource staffs has established that Project Design Criteria are effective.

Comment: 14-17

Implementing the project would increase the area of detrimental disturbance, violating the Soil Quality Handbook and the Forest Plan. The DEIS states (p. 3-68) that the project would comply with soil standards because project design criteria would be followed. But there is no analysis of the effectiveness of these criteria, only conclusive statements that they will be effective. (Environmental Conservation/ Preservation)

Response: See response from comment 14-17 as related to watershed disturbance. It is true that prevention is cheaper than restoration, but existing detrimentally disturbed areas are not being rehabilitated at all. Project Design Criteria (PDC) are implemented to reduce new impacts, while providing the opportunity to restore area that were affected by past actions. While some new detrimental disturbance is expected, there would be benefits to rehabilitating past impacts. Based on the analysis completed for the FEIS, public comments, and other criterion, the Responsible Official may choose to implement any of the action alternatives, no action, or a combination of the analyzed alternatives.

Comment: 14-18

The areas and watersheds with a high level of disturbance should be avoided. This would reduce the potential for additional detrimental disturbance and reduce the cost of restoration of disturbed areas (Environmental Conservation/ Preservation)

Response: The calculation of connected disturbed area (CDA) is not required by the watershed conservation practices handbook. However, an analysis of the connectivity of disturbed areas is required in some manner. It is noted in the FEIS that only two perennial stream crossings are present in the analysis area (FEIS pg. 3-56, 2nd paragraph). These crossings are discussed in detail within the document and need to be addressed if project activities proceed. Additionally, it is noted that the construction of new temporary roads would have no effect on watersheds outside of localized soil disturbance (FEIS, pg. 3-57, 1st paragraph). It is noted that if roads have healed and are then bladed, care needs to be taken to disconnect any possible sediment sources from streams (FEIS, pg. 3-56, 2nd paragraph). The determination that the up to 2 miles of additional road having no watershed effects outside of localized soil disturbance would indicate that the CDA expansion would not exceed the 10 percent limit indicated in the Watershed Conservation Practices Handbook. Implementation of Best Management Practices would lead towards the end goal of zero or near zero CDA within the project area.

Comment: 14-19

CONNECTED DISTURBED AREA MUST BE CALCULATED, DISPLAYED, AND MINIMIZED. The Watershed Conservation Practices Handbook, FSH 2509.25, section 05, defines “connected disturbed areas” as follows:

High runoff areas like roads and other disturbed sites that have a continuous surface flow path into a stream or lake…. Hydrologic connection exists where overland flow, sediment or pollutants have a direct route to the channel network. CDAs include roads, ditches, compacted soils, bare soils, and areas of high burn severity that are directly connected to the channel system. Ground disturbing activities located within the water influence zone should be considered connected unless site-specific actions are taken to disconnect them from streams. (Citations omitted.)

The WCPH has the following design criterion concerning CDA:

In each watershed containing a 3-rd (sic) order and larger stream, limit connected disturbed areas so the total stream network is not expanded by more than 10%. Progress toward zero connected disturbed area as much as practicable. Where it is impossible or impracticable to disconnect a particular connected disturbed area, minimize the areal extent of the individual connected disturbed area as much as practicable. In watersheds that contain stream reaches in diminished stream health class, allow only those actions that will maintain or reduce watershed-scale Connected Disturbed Area.[…]However, we do not find a discussion of connected disturbed area (CDA) in the EIS. It is not listed as one of the indicators for watershed condition and effects of action (DEIS at 3-42), but should be. As the DEIS notes, “[d]isconnecting…drainage from streams and routing drainage from roads through appropriate buffers is crucial to minimizing sedimentation potential”. Id. at 3-55. The WCPH, section 11.1, states that “[c]onnected disturbed areas are the main source of damage in all regions”. (Citations omitted, emphasis added.)

The need for disconnecting drainage from roads includes closed roads with some recovery that would be bladed and used for the project. See ibid. Commendably, a design criterion at least partially addresses this issue. It requires careful design when roads are reconstructed within 100 feet of stream. DEIS at 2-9, next to last criterion under Soil and Water Protection.

But the FEIS must show current CDA, and what it would be after implementation of each action alternative. The latter must not be more than the 10 percent limit imposed by the WCPH. (Environmental Conservation/ Preservation)

Response: The proposed WUI fuels treatments, as described, are consistent with the Forest Plan and all Roadless Area characteristics would be maintained over the long- term (FEIS pg. 3-89). As stated in section 3.14, pg. 3-79, FEIS, any piles generated would be small and burned in the winter when summer residents are not present.

Comment: 14-20

MINIMIZE THE IMPACTS OF TREATMENTS IN ROADLESS AREAS. Under the proposed action, 94 acres in two roadless areas would receive "limited WUI fuel treatments". DEIS at 3-87. It is important that all roadless area characteristics be retained. (See 36 CFR 294.11 (2001) for a list of these characteristics.) There should be no roads, skid trails, landings, or use of heavy mechanical equipment in the roadless areas. Slash treatment can consist of treating in place with chainsaws and scattering, handpiling and burning, broadcast burning, and/or removal using non-motorized equipment. (Environmental Conservation/ Preservation)

Response: The decommissioning of roads was brought up during the initial scoping of the proposed action and therefore was added and analyzed as part of Alternative 3. The Responsible Official can choose to implement all or parts of any of the alternatives that were analyzed in the FEIS.

Comment: 14-21

DECOMMISSION ROADS AS PART OF ANY ACTION ALTERNATIVE. Mysteriously, roads would be decommissioned only under alternative 3. Given the large amount of area disturbed from previous actions (see DEIS at 3-56 et seq.), any unneeded roads should be closed, regardless of what alternative is approved. (Environmental Conservation/ Preservation)

Response: The Forest Service currently uses the term road decommissioning rather than obliteration. Road decommissioning is defined as: "Activities that result in the stabilization and restoration of unneeded roads to a more natural state." (36 CFR 212.1, FSM 7705 - Transportation System) The Forest Service Manual 7712.11- Exhibit 01 identifies five levels of treatments for road decommissioning which can achieve the intent of the definition. These include the following: 1) Block entrance; 2) Revegetation and waterbarring; 3) Remove fills and culverts; 4) Establish drainageways and remove unstable road shoulders; 5) Full obliteration recontouring and restoring natural slopes. These five treatment levels provide the interdisciplinary team a wide range of options to stabilize and restore unneeded roads. The route to deciding what treatment level or combination of treatments is used is based on a watershed analysis and roads analysis. In some cases restoration may be achieved by blocking the entrance. In other situations, objectives to restore hillslope hydrology may require full obliteration recontouring. Full obliteration was not determined to be needed to restore hydrologic function in this area. Specific effects of each road and the response to a decommissioning treatment are strongly influenced by local factors which include climate, geology, topography, soil, road design and construction. All roads being proposed for decommissioning are currently closed to the general public motorized travel, section 2.2 in the FEIS. Increased law enforcement is not expected to be needed, though the situation would be monitored. Additional actions may be needed to ensure existing gates are still function for blocking motorized traffic (see section 2-6, Monitoring).

Comment: 14-22

Roads should be obliterated, not just “decommissioned”.[…]we believe obliteration should also include the following, as needed: blocking the entrance to each segment to be obliterated, removing cuts and fills, transplanting seedlings and saplings onto the former road surface, and increasing law enforcement patrols in areas with recently obliterated roads. (Environmental Conservation/ Preservation)

Response: As stated in the FEIS, it was felt that the range of hazard tree removal distances would best meet the needs for a variety of resource objectives, while meeting the primary objective of protecting infrastructure present in the analysis area in an effective manner. As described in the FEIS, the types of infrastructure in or adjacent to the project area include campground developments, private wells, linear power lines, roads, fences, livestock water developments, land survey monuments, and homes or other structures. It is felt that a fixed distance would not provide sufficient flexibility to meet protection objectives in all these situations, especially considering the shallow-rooted growth habitat and blowdown potential of subalpine fir, Engelmann spruce, and blue spruce. Partial removal of any of these species can result in the residual trees becoming hazardous due to an increase in blowdown risk. The 1.1 to 2 tree heights is needed to meet the purpose and need of protecting valuable infrastructure, meeting other resource objectives, along with doing what is necessary to protect public and employee safety in high risk situations.

Comment: 14-23

THE DISTANCE ALLOWED FOR HAZARD TREE REMOVAL IS MUCH LONGER THAN NECESSARY.[...]Hazard tree removal would be implemented within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins, utility lines, or other infrastructure.[...]While the distance from facilities that hazard trees need to be removed may vary slightly by terrain and other factors, we do not see why removal for a distance of twice the height of the tallest trees would ever be necessary. Removal distance of the height of the tallest tree plus 10 percent should be sufficient.

The greater the removal distance, the greater the danger of creating a linear corridor, which a design criterion requires avoiding. DEIS at 2-8. (Environmental Conservation/ Preservation)

Response: As stated in section 3.4 of the FEIS, the Forest Service recognizes that stumps may help spread root disease, but partial cutting may also lead to increase vigor and resistance (Mask and Worrall 2011). The Forest Service also estimates the *armillaria* root disease is at endemic levels in the project area.

Comment: 14-24

DEIS p. 3-8 states that stumps can help spread *armillaria* root disease, but p. 3-10 states that alternative 2 is unlikely to do so because the pathogen does not produce airborne spores. The latter is true, but stumps still help spread the disease. (Environmental Conservation/ Preservation)

Response: As described in the paragraph referenced (section 3.12, Temporary Road Construction), the location of new temporary roads would be on flat to gentle slopes, any soil or material deposited in a fill area is expected to be minimal. Temporary roads would be closed out following use as described section 3.17, pg. 3-94, FEIS.

Comment: 14-25

DEIS page 3-65 speaks of using fill material for temporary roads. Such roads may not be temporary, as it is usually difficult to remove fill and restore pre-construction conditions. (Environmental Conservation/ Preservation)

Response: The Black Mesa Project has had the full involvement of the District Wildlife Biologist and Technician, whose input have been utilized to help minimize impacts to lynx and other wildlife and also to minimize the conversion of habitat to temporarily unsuitable. Section 3.6 contains a summary of the potential effects of the project alternatives on lynx. A more thorough analysis of potential effects upon lynx is included in the Wildlife Report and Biological Assessment in the Project Record. The Responsible Official may implement any of the alternatives or a combination of alternatives.

Comment: 14-26

Impacts to lynx and other wildlife must be minimized. Cuts should be designed to minimize or eliminate conversion of habitat to unsuitable. Possible impacts to lynx from widespread bark beetle attacks and proposed salvage logging must be analyzed. (Environmental Conservation/ Preservation)

Response: See responses to comments 14-16, 14-17, 14-19, and 14-20.

Comment: 14-27

Areas that are already heavily disturbed should not be treated. Connected disturbed area must be calculated and kept within the limits imposed by the WCPH. (Environmental Conservation/ Preservation)

Response: See responses to comment 14-24 and comment 14-25.

Comment: 14-28

Unneeded roads should be fully obliterated in any action alternative. The distance from infrastructure for removing hazard trees should be reduced to about the height of the tallest trees plus 10 percent. (Environmental Conservation/ Preservation)

Comment Letters Received on DEIS

Letter 1
Comment 1-11

Robert Siddons
724 Vanguard St
Austin, TX 78734

I am in favor of the project, however I am concerned about damage the large trucks will do to the area road system. I have a ranch in south Texas in the Eagleford shale gas play area and I have seen what heavy truck traffic can do to the infrastructure. Most of the Counties in the South Texas area were not prepared or properly funded to deal with road damage that has occurred. I would suggest that part of the planning and funding of this project be dedicated to the repair of road damage that will surely occur.

Thanks.

Letter 2
Comments 2-1, 2-2

Diana McGinn, Interdisciplinary Team Leader
San Luis Valley Public Lands Center
Rio Grande National Forest
1803 W. Highway 160
Monte Vista, Co 81144

April 27, 2012

Subject: Public Comment - Black Mesa Vegetation Management Project,
Rio Grande National Forest

Dear Sirs:

We, the Board of Directors for Hermit Lakes Recreation Inc., are writing in support of the proposal to remove the Spruce Beetle stricken and dead trees, and their associated fuel loads, in the Rio Grande National Forest Black Mesa Vegetation Management Project area. Hermit Lakes is surrounded by the Rio Grande National Forest and the forest's thousands of acres of dead and dying trees. We are in support of your preferred option #2 since it provides the best option to mitigate the fire and safety danger to our members. We will be notifying the one hundred twenty two (122) members of our corporation to ask them to write personal letters in support of your efforts. While the Corporation owns all the land associated with Hermit Lakes Recreation Inc. and some of the common buildings, the individual members own their cabins and their out-buildings.

We recognize that time is of the essence in this matter, since the trees are already dead or dying and there is a serious lack of snowpack in the Rio Grande Basin this year. No entity or group of people has any more at stake in this matter than our members, both in terms of their personal safety and their property's safety. To that end, we are willing to cooperate with the USFS to the highest degree possible. We are also willing to provide reasonable access to, and through, our property for your personnel and equipment if needed.

This pristine area provides the crystalline water that constitutes the beginning of the Rio Grande River Basin. It is also critical summer range for many wild game species and migrating birds that have historically used this area for reproduction, habitat, and a migratory stopover point. Any large wild land fire would not only devastate this area but the negative implications for habitat, birds, animals, humans, and water quality downstream would be huge.

If we can be of any assistance to you, the USFS, or your Rio Grande office please contact me anytime. Please be advised that Hermit Lakes Recreation Inc. wishes to be a participant in any subsequent administrative review or judicial review process

Sincerely Yours,

Jim Moore, Board President
Hermit Lakes Recreation Inc.
4100 USFS Rd 515
Creede, CO 81130
719-658-0336

785 Von Bieker Drive
Lander, WY 82520
307-332-3062

From: Wayne [mailto:wynhmphry@aol.com]
Sent: Saturday, May 05, 2012 12:08 PM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: Black Mesa Vegetation Management Project

Letter 4
Comments 4-1, 4-2

Dear Sirs:

Without any hesitation we want to express our strong support for the Black Mountain Vegetation Project Option 2. We are property owners at Hermit Lakes and live in close proximity to the proposed treatment area. Our mountain home was surrounded by spruce trees which were dying or were dead this past summer that required us to hire a private logger to remove trees and ladder fuels from the area around our home at a cost of several thousand dollars. We feel if this Black Mountain project were to be approved we would stand a chance of saving our home in the event of a fire. We are very heavily invested in our home and realize that time is of the essence.

We and the others in the valley have a great deal at stake in the safety of our homes as well as our personal safety. Also as you are well aware Hermit Lakes is part of the head waters of the Rio Grande River, and as such, a fire could be disastrous to the water supply of the river. Not to mention the devastating effect on wild life, South Clear Creek, Brown Lakes etc.

For the above and many more reasons, we urge you to approve Option 2 of the Black Mountain Vegetation Project.

Sincerely,

Wayne & Virginia Humphrey
#231 Hermit Lakes
4100 USFS Rd. 515
Creede, Colorado 81130
719-658-0357

From: Dan Moore [mailto:damoore@bresnan.net]
Sent: Friday, April 27, 2012 12:44 PM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: "Black Mesa Vegetation Management Project"

Letter 5
Comment 5-1

Dear Sirs:

We would like to comment on the Black Mesa Vegetation Management Project proposal. We are in full support of the proposed logging mitigation plan (# 2 preferred option) as conceived. We own property at Hermit Lakes and are directly affected by the proposed plan. We know how critical it is to remove this fuel load as soon as possible and wish to express our support for any plan that would expedite the logging of this proposed area. We are available at any time to speak for this project or do whatever is necessary to help.

Sincerely Yours,

Patricia and Daniel Moore
4100 USFS Road 515
Hermit Lakes, Colorado 81130
719-658-0240

844 Larchwood Street
Fruita, Colorado 81521
970-433-7866
970-433-8542 Cell

Letter 6
Comment 6-1

From: J Moore [mailto:jimoore@bresnan.net]
Sent: Friday, April 27, 2012 2:04 PM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: "Black Mesa Vegetation Management Project"

Diana McGinn,
1803 W. Highway 160,
Monte Vista, CO 81144

"***Black Mesa Vegetation Management Project***"

April 27, 2012

Dear Sirs:

I am sending this email in support of your proposal for the logging management of the Black Mesa Vegetation Management Project. I support option #2 which is your proposed preferred treatment plan. As a land owner within the treatment area, Hermit Lakes Lot #177, I am directly affected by the massive Spruce Beetle epidemic within the Rio Grande National Forest. Your proposed treatment plan would substantially increase my physical and property safety. Please contact me if there is anything I can personally do to further this project.

Sincerely,

James Moore
#177 Hermit Lakes
4100 USFS Rd. 515
Creede, CO 81130
719-658-0336

785 VonBieker Dr.
Lander, WY 82520
307-349-0869

Letter 7
Comment 7-1

From: Bob Prentice [mailto:builder.bob@live.com]
Sent: Sunday, May 20, 2012 5:08 PM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: Black Mesa management project

To whom it may concern:

My name is Bob Prentice and I am on the board of directors at Hermit lakes. As a representative for hermit Lakes, I would like you to know that we are in favor of any fuel reduction/logging projects. Regardless of any roads that might need to be built, we are in favor of getting as much timber removed as possible and will gladly give access through our property. The longer we wait to get these trees out, the less they are worth and the more likely fire will devastate our property.

Respectfully yours, Bob Prentice

Letter 8
Comment 8-1

-----Original Message-----
From: Verna Schmittel [mailto:schmitteltrails@centurytel.net]
Sent: Thursday, April 26, 2012 8:13 AM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: Blacj Mesa Vegetation Management Project

Attn: Diana McGinn

Due to the intense scrutiny this activity will engender I have no doubt it has been very carefully thought out and prepared. The only way to mitigate the damage from the beetles is to put the dead and dying trees to useful purposes. It is also important to protect private land and to lessen the possibility of trees falling on people, vehicles, etc. An orderly activity, planned and prepared carefully, is the right way to proceed. I endorse alternative #2 wholeheartedly.

Verna Schmittel
Saguache, CO

Letter 9
Comment 9-1

Divide Ranger Dist.
Diana McGinn
1803 W Hwy 160
Monte Vista, CO 81144

Randy Riggs
PO Box 271
Creede, CO 81130

I am very much in favor of alternative No 2 Proposed Action. This alternative is the best for the forest and the local economy.

Project # 34667

Sincerely,

Randy Riggs

Randy Riggs

United States Department of the Interior
OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 67, Room 118
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

June 4, 2012

9043.1
ER 12/302

Letter 10

Thomas Malecek, District Ranger
Divide Ranger District
Rio Grande National Forest
13308 West Highway 160
Del Norte, CO 81132

Dear Mr. Malecek:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the Black Mesa Vegetation Management Project, Divide Ranger District, Rio Grande National Forest, Hinsdale and Mineral Counties, CO and has no comments on the document.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

cc: Diana McGinn, Interdisciplinary Team Leader

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

JUN 05 2012

Letter 11
Comments 11-1 through 11-8

Ref: 8EPR-N

Thomas Malecek, District Ranger
Divide Ranger District
Rio Grande National Forest
13308 West Highway 160
Del Norte, CO 81132

RE: Black Mesa Vegetation Management Project Draft Environmental Impact Statement, CEQ #20120126

Dear Mr. Malecek:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA), 42 U.S.C. Section 4321, *et seq.*, and Section 309 of the Clean Air Act, 42 U.S.C. Section 7609, the U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the April 2012 Draft Environmental Impact Statement (EIS) for the Black Mesa Vegetation Management Project. This Draft EIS was prepared by the Divide Ranger District of the U.S. Department of Agriculture Forest Service (USFS) Rio Grande National Forest to analyze potential environmental impacts associated with salvaging timber stands being killed by spruce beetle, implementing fuel reduction treatments in Wildland-Urban Interface (WUI) areas, and managing hazard trees that may impact infrastructure in the Black Mesa project area.

The Black Mesa Project Area is located within Hinsdale and Mineral Counties and is approximately 15 miles west of the town of Creede, Colorado. The project area includes approximately 49,046 total acres. It includes several private in-holdings and is bordered to the south by the Weminuche Wilderness Area.

A summary of the three alternatives analyzed in the Draft EIS is as follows:

- Alternative 1 (No Action) – no vegetation or fuels management actions;
- Alternative 2 (Preferred Alternative) – salvage and regenerate approximately 9,410 acres of beetle infested Engelmann spruce stands; hand plant approximately 1,740 acres in areas not meeting desired forest levels following treatment; relocate 2 miles of road, construct 3.6 miles of new temporary road, and maintain 5.4 miles of old non-system roads from previous harvests; implement hazard tree removal near open roads, fences, private land, cabins or other infrastructure; and implement fuel reduction treatments on approximately 436 acres in WUI areas;

- Alternative 3 (Limited Action) – salvage harvest approximately 6,587 acres; hand plant approximately 995 acres; construct 0.9 miles of new temporary road and maintain 4.4 miles of old non-system roads; hazard tree removal and fuel reduction treatments would be the same as Alternative 2.

In a May 9, 2011 letter, the EPA provided scoping comments for this project. We appreciate that the USFS addressed many of our comments in the Draft EIS. As a result, our concerns with the April 2012 Draft EIS have been narrowed to these issues: (1) aquatic resources and (2) air quality. These concerns are the basis for the EPA's EC-2 rating discussed at the conclusion of this letter.

1) Aquatic resources in the project area are important and require evaluation and mitigation of associated impacts.

The EPA considers protection of aquatic resources to be among the most critical issues to be addressed in any NEPA analysis for vegetation management activities. Most treatments contemplated under the proposed action (e.g., harvest, fuel reduction, hazard removal and road construction) have the potential to adversely impact aquatic resources, including wetlands, streams, riparian areas, and their supporting hydrology. Given the EPA's concerns regarding aquatic resources, we recommend that the USFS evaluate impacts resulting from the alternatives by providing complete data and robust analyses of potential impacts.

Existing Conditions: The Draft EIS includes a detailed discussion of the proper functioning condition (PFC) assessments that were performed on 19 stream reaches within three watersheds in the project area that are considered to be of concern due to past management-related disturbance. In addition to physical indicators observed during the PFC assessments, the USFS collected water quality data including pH, temperature, electrical conductance, and macro-invertebrate counts. However, these data do not appear in the Draft EIS. In addition to fulfilling the need for baseline information to measure future changes, such data are important for understanding the current condition of water quality in the project area. For this reason, we recommend that the USFS present the data, or at a minimum a summary of the data, in the Final EIS.

Wetlands, Springs and Seeps: Although the Draft EIS includes Design Criteria to protect wetlands, springs and seeps it does not provide any information describing the extent to which such sensitive resources are expected to be present in the project area. Despite the 100 foot setback for surface disturbing activities, indirect impacts to wetlands, such as water quality impacts, may still occur. For this reason, it is important for the public and the decision maker to understand how many wetlands, springs and seeps are present in the areas proposed for treatment under each alternative. We recommend that the Final EIS include a discussion of the presence and existing condition of such resources, including a map showing their location relative to areas proposed for treatment.

Impact of Roads on Aquatic Resources: To reduce adverse impacts to watersheds, the EPA recommends minimizing new road construction and road density, as well as locating roads to limit impacts to surface waters. The preferred alternative would necessitate 2 miles of relocated system road, 3.6 miles of new temporary road, and 5.4 miles of restored old non-system road to facilitate treatment activities. While field observations of the road system were made to identify problem areas with the potential to deliver

sediment to stream channels, it is not clear to what extent new or restored non-system roads may impact sediment loading to water resources. We recommend that the Final EIS discuss the location of planned road construction/reconstruction with respect to intermittent or perennial streams. We additionally recommend the Record of Decision include a commitment to monitor road reconstruction and new road activities to ensure that Design Criteria are performing as intended to protect water resources.

2) Air quality impacts associated with the project are a critical concern that must be fully evaluated.

It is particularly important to assess and mitigate air quality impacts associated with the Black Mesa Project given that the project area borders the Weminuche Wilderness Area (i.e., a mandatory Class I Federal area).

Existing Conditions: In addition to the example graphs provided in the Draft EIS that show particulate matter concentrations over the time period from 2000 to 2010, we recommend that the Final EIS include a summary table indicating the current background concentrations of all criteria pollutants. This will provide a more complete current air quality baseline in the project area for comparison to anticipated impacts. In addition, because visibility is a protected air quality related value (AQRV) in mandatory Class I Federal areas, we recommend that the Final EIS include a graph showing visibility trends in the Weminuche Wilderness Area over the past several years. AQRV data are readily available from the VIEWS website (http://views.cira.colostate.edu/web/).

Emissions Inventory: The Draft EIS discusses several project activities that could impact air quality including vehicle emissions from logging equipment, dust from travel on unpaved roads and burning of slash piles. The Draft EIS does not include information on what pollutants would be emitted, in what quantities, and how those emissions may impact air quality and AQRVs. We recommend that the Final EIS include a qualitative discussion of criteria pollutants anticipated to be emitted by project activities and how the emissions are predicted to impact air quality and AQRVs in the project area including the Weminuche Wilderness Area and town of Creede.

Mitigation: The Draft EIS indicates that dust abatement would be required on portions of FSR 520 if logging occurs during the summertime, but gives no detail on how dust abatement would be accomplished. We recommend that the Final EIS include a detailed dust control plan including control methods, frequency and/or triggers for application, and expanded to include other project area roads and logging areas which may also warrant dust abatement.

EPA's Rating and Recommendation

Consistent with Section 309 of the CAA, it is the EPA's responsibility to provide an independent review and evaluation of the potential environmental impacts of this project. Based on the procedures the EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action, the EPA is rating this Draft EIS as Environmental Concerns – Insufficient Information (EC-2). The "EC" rating indicates that the EPA review has identified environmental impacts that need to be avoided in order to fully protect the environment. The "2" rating indicates that the EPA has identified a need for additional information, data, analyses or discussion in the Final EIS in order for the EPA to

fully assess environmental impacts from the proposed project. A full description of the EPA's rating system is enclosed.

We hope that our comments regarding aquatic resources and air quality will assist you in further reducing the environmental impacts of this project. We appreciate the opportunity to review and comment on this Draft EIS. If we may provide further explanation of our comments, please contact me at 303-312-6925. You may also contact Molly Vaughan, lead reviewer for this project, at 303-312-6577 or vaughan.molly@epa.gov.

Sincerely,

Suzanne J. Bohan
Director, NEPA Compliance and Review Program
Office of Ecosystems Protection and Remediation

Enclosure

— Sorry this is handwritten - Please call if you have any questions

Your Community Voice in the Carson

Letter 12
Comments 12-1 through 12-15

Re: Black Mesa Project DEIS

April 27, 2012

Tom Malecek and
Diana McGinn
US Forest Service - Rio Grande N.F.
1803 W. Hwy. 160
Monte Vista, CO 81144

Carson Forest Watch
Box 15 Llano, NM • 87543 •
(575) 587-2848

On behalf of our citizens group in Taos County, the following are comments regarding the DEIS for the Black Mesa Project:

1) As we wrote previously in our scoping comments - we remain concerned regarding both the short and long term effects of this project upon forest wildlife - especially Canada lynx, pine marten, boreal owl, and Rio Grande cutthroat trout - all species of great concern.

2) This project will have significant impacts upon the forest - and especially cumulative impacts from past recent Salvage sales nearby. We believe the DEIS fails to fully disclose and address adequately these cumulative impacts esp. upon wildlife sensitive to disturbance from roads, vehicles, forest fragmentation, edge effects, and human presence —>

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we will begin to use it with love and respect."

— Aldo Leopold

A Sand County Almanac

3) The DEIS presents inadequate data regarding how Wildlife respond to Salvage Sales – and how viable populations of species already at risk will be maintained.

4) The effects of such large volume of trees removed upon the Rio Grande watershed need more analysis and disclosure. There is a huge negative effect from erosion, compaction, drying of soils, and loss of biodiversity and soil nutrients from removing large snags and would fill and become soil nutrients and habitat as they decompose.

5) This creates a significant adverse effect because such a large area will be treated. mitigation is not adequate to protect our Rio Grande headwaters area here. Mitigation is no substitute for protection, and has failed in past Sales we have monitored in the area. (esp. at such high altitude areas). The DEIS fails to disclose (1) how effective past mitigation has been in salvage sales nearby, (2) what monitoring was done (as required) to assess how mitigation was effective, and (3) what failure of mitigation will result in further resources loss.

6) The preferred alternative (2) would create the longest miles of road system, and remove the largest number of trees. Why does the Forest Service propose an alternative that will have the greatest negative effect upon numerous resources of concern? There is no justification or clear Rationale (as required by NEPA) for choosing alt. 2. Only to provide forest products. This alt is given as a goal of Timber Industry, and we recommend a further conservative, and we recommend a further examination →

page 2

Your Community Voice in the Carson

of alternative 3 with modifications to further protect Canada lynx.

Carson Forest Watch
Box 15 Llano, NM • 87543 • [redacted]-587-2848 (595)

7) By treating fewer acres - impacts to lynx and other species of concern will be lessened; also - fewer impacts to soils, and more chance that forest regeneration will occur.

8) There is no way a project of this size - ~~over~~, under alt. 2 can be conducted (and monitored) in approx. 5 years. (2013-2017 ? 2018) as the DEIS proposes. Thus - the long & short term impacts of this will be far greater than described.

- for one thing - there are not enough local wood products companies to even handle such large volume of trees.

- also - weather and other factors mean this area will be under disturbance for at least 10 years - effectively driving Canada Lynx, Boreal Owl, and other species out of the area. for species such as lynx - this will decimate the population as no breeding can occur. Recovery will be set back 5+ - significantly for lynx and this violates the ESA, and is avoidable by designing an alternative →

that reduces negative impacts, and minimizes disturbance.

9) Rather than maximize timber harvest - the DEIS needs to focus much more upon minimizing disturbance to wildlife and minimizing disturbance to this watershed. We fail to see an action alternative that does this.

10) also under cumulative effects; we fail to see in the DEIS any discussion of future impacts; there is slight mention of private lands treatments possible in the future - however - no mention of possible timber sales, salvage sales, recreation pools projects, and other actions on Forest Service nearby; this violates NEPA, and the DEIS must address this issue.

11) With Forest Service budget cuts, and likely future budget restrictions - how will monitoring be conducted? We don't see how the District can possibly monitor a sale of this size in a full and effective manner. Promises on paper are not adequate - the DEIS needs to address staffing and budget realities, and clearly disclose a monitoring plan. (How many acres staff can monitor for year, what data will be gathered, what resources will be monitored, etc.)

Page 3

CARSON FOREST WATCH
P.O. Box 15
Llano, NM 87543

12) The DEIS gives NO explanation of USFish and Wildlife determinations or Forest Service determinations of Lynx Impacts.

It merely states that the alternative 2 and 3 will meet "exemptions & exceptions on an IAU. This is not acceptable under the E.S.A.

- There is no discussion or disclosure of how these "exemptions" will affect Lynx across the landscape, how many have already been granted and how managing by "exemption & exception" is going to protect and Recover this Endangered species.

13) There needs to be a real analysis here - not just statements that numbers are met. The effects of human disturbance, loss of cover & habitat security, and loss of movement corridors need more discussion.

14) The same concern extends to other species of concern - like migratory birds, pine marten, raptors, etc. There needs to be more analysis of how years of harvest, roads, disturbance by machinery & people, etc. will displace these species.

15) I.E. - Where will species disperse to, how →

intact is this habitat, are there adequate
movement corridors, etc?
The DEIS just ignores this vital concern,
and violates NEPA by doing so.

16) We failed to see analysis of <u>fresh fragmentation</u>
from this project - in particular the <u>impacts</u>
of miles of Road network re-opened and constructed
for this project. It will result in over 10 years of
roads in this area and the DEIS fails to
disclose how this and the harvest of millions of
Board feet of timber will fragment fresh spaces
sensitive to this disturbance.

Please address these concerns - and:
1) conduct a more <u>thorough</u> analysis, giving a
real "hard look" at impacts from this action,
esp. to wildlife and watersheds.
2) <u>Develop another alternative</u> that treats far
fewer acres, has less impacts, is easier
monitor, and will not create such huge impacts,
openings, drying of soils, erosion, roads and other
negative effects.

Thank you,
Sincerely,
Joanie Bede
for Carson Forest Watch

cc: Colorado Wild, Wild Earth Guardians, et al

From: rhumphrey5425@comcast.net [mailto:rhumphrey5425@comcast.net]
Sent: Wednesday, May 02, 2012 8:03 PM
To: FS-comments-rocky-mountain-rio-grande-divide
Subject: Blacjk Messa Vegation Mangement Project

Letter 13
Comment13-1, 13-2

Dear Sirs:

We are writing to express our strong support for the Black Mountain Vegetation Project Option 2. We are property owners at Hermit Lakes and live in close proximity to the proposed treatment area. Our mountain home was surrounded by spruce trees which were dying or were dead this past summer that required us to hire a private logger to remove trees and ladder fuels from the area around our home at a cost of several thousand dollars. We feel if this Black Mountain project were to be approved we would stand a chance of saving our home in the event of a fire. We are very heavily invested in our home and realize that time is of the essence in this matter since thousands of trees are either dead or in the process of dying .

We and the others in the valley have a great deal at stake in the safety of our homes as well as our personal safety. Also, as you are well aware, Hermit Lakes is part of the head waters of the Rio Grande River, and as such, a fire could be disasterous to the water supply of the river. It would also destroy the summer range for a great many game animals as well as birds and other smaller animals.

For the above and many more reasons, we urge you to approve Option 2 of the Black Mountain Vegetaion Project.

Sincerely,

Ray & Jane Humphrey
#193 Hermit Lakes
4100 USFS Rd. 515
Creede, Colorado 81130
719. 658-1041

ROCKY MOUNTAIN WILD

Protecting wild lands for wildlife

Letter 14
Comments 14-1 through 14-28

San Luis Valley Public Lands Center
Atn: Diana McGinn
1803 W. Hwy 160
Monte Vista, CO 81144

Via e-mail: comments-rocky-mountain-rio-grande-divide@fs.fed.us

June 8. 2012

Dear Ms. McGinn:

The following are the comments of Rocky Mountain Wild, Great Old Broads for Wilderness, and San Luis Valley Ecosystem Council on the proposed Black Mesa Vegetation Management Project, as described in the Draft Environmental Impact Statement (DEIS) for the project.

I. THE PROJECT IS MUCH LARGER THAN WHAT COULD OR SHOULD BE IMPLEMENTED. Under the proposed action (alternative 2), up to 60 million board feet would be offered for sale. Note that the project is intended to make wood available:

> The intent of the salvage is to place timber on the market for the American public in time to capture the value of the beetle-killed spruce trees, before the effects of wood decay eliminates that value.

DEIS at 3-14. (See also id. at 4.) But it is hard to imagine how this amount of wood could ever be sold in a reasonable period of time, say while the trees to be cut are still millable into dimension lumber. While the beetle-killed spruce trees will likely remain standing for some time, they will develop checks and splits, and suffer other forms of decay, that will soon make the trees unsuitable for milling into dimension lumber such as 2 X 4s. It is not clear if the material could be made into biomass. The dead spruce trees could be used for house logs, but currently, the demand for all forms of wood is low, given the poor state of the national and regional economies.

The one large mill that could possibly bid on, and cut, sizable amounts of wood offered from the area. Intermountain Resources, is in receivership and is currently unable to bid on national forest timber sales. (DEIS at 3-79). This has led to more sales being awarded to smaller outfits. Ibid. But these mills could not possibly utilize anywhere near 60 million board feet in the next 10 years, the time period said to be how long the project would take to implement. DEIS at 3-89. For any mills that could bid on sales offered from the Black Mesa area, the poor economy limits how far such companies could economically travel to get raw material. DEIS at 3-80.

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It does not make sense to approve a huge sale of wood from the area in hopes that the economy will soon change, as there is little indication of a major improvement in the foreseeable future. Even if the economy did improve, NEPA might have to be redone for the project, as under guidance from the Council on Environmental Quality, NEPA for approved but unimplemented projects is considered stale after five years.[1]

Another reason to not implement the proposed action is that removal of large areas of spruce trees infested with, or already killed by, bark beetles would essentially create large clearcuts. DEIS Table 3-5 on page 3-13 shows that bark beetle infestation is 90-100 percent in every proposed treatment area. See also Id. at 3-20. Three such units are 100 percent spruce, while all but one of the remaining units is at least 70 percent spruce, with most having 80 percent or more spruce. Id at 3-13. Under the proposed action, "[m]erchantable trees 8 inches diameter breast height (dbh) and larger would be considered for harvest". DEIS at 2-2. Thus virtually all trees in some stands could be cut, since only six snags per acre would have to be retained. Id. at 2-10.[2] The cut is termed the "final removal" and a "type of regeneration harvest". Id. at 8. The resulting landscape would have reduced habitat for various wildlife species and less ability to trap and retain moisture, especially snow. The use of heavy equipment over a large area increases the damage to soils.

Cutting and removing dead trees is also likely to destroy much of the advance regeneration. Note that every proposed unit has a substantial number (200 to 2000) of trees per acre of "current regeneration". DEIS at 3-13. Felling and skidding the overstory trees is likely to damage and destroy a considerable percentage of this regeneration.

Removing most or all of the trees from large areas would not allow the scenic integrity objectives (SIOs) for the project area to be met. The SIO is moderate for much of the area and high for the remainder. FEIS at 3-96. The high and moderate SIOs are defined as follows:

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[1]From "Questions and Answers About the NEPA Regulations":

> Q. Under what circumstances do old EISs need to be supplemented before taking action on a proposal?
>
> A. As a rule of thumb, if the proposal has not yet been implemented, or if the EIS concerns an ongoing program, EISs that are more than 5 years old should be carefully reexamined to determine if the criteria in [40 CFR] Section 1502.9 compel preparation of a supplement. …

46 Fed Reg 18028, March 23, 1981.

[2] Another design criterion requires retention of "patches of overstory trees with dense understory". Ibid. However, it is not clear if this applies to dead trees or only live ones, and there are no definitions of what is a "dense" understory nor of how large a patch needs to be.

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> ***High*** – Landscape setting appears intact. Human activities are not visually evident. Activities may only repeat attributes of form, line, color, and texture found in the existing attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.
>
> • ***Moderate*** – Landscape appears slightly altered. Human activities are evident but are visually subordinate to the existing landscape character. They may repeat form, line, color or texture common to these characters, but changes in quality, size, number, intensity, etc. must remain visually subordinate, qualities or traits of a landscape that give it an image and make it identifiable or unique.

DEIS at 3-95.

If either of the DEIS' action alternatives is approved, something we do not recommend, much more area must remain unlogged than is currently proposed in order to conserve existing regeneration, wildlife habitat, scenery, and other resources.

Given the economic realities as well as effects to resources, the Forest Service should analyze and approve a much smaller project in the Black Mesa area. This is discussed further in section III below.

II. PROTECT LYNX HABITAT. Currently, the project area has lynx habitat, even though the overstory spruce are dead or dying. There is also an understory in every proposed treatment unit, with some of these likely having dense understories. See DEIS at 3-13. The overstory trees will likely remain standing for some time, providing cover for lynx, who can hunt hare in the understories.

Removing the overstory would remove the needed cover, converting the habitat to unsuitable. See DEIS at 3-20. Once the overstory is removed, it will be many decades before the treated area is suitable lynx habitat. The trees removed would not become future denning habitat, as would otherwise occur if they were allowed to naturally fall to the ground. Also, there would be some damage to the understory as the result of such operations, assumed to be 30 percent at DEIS p. 3-20.

Given that stands are dominated by spruce and that all dead and dying trees eight inches or greater in diameter would likely be cut (see DEIS at 3-13 and section I above) over 9410 acres (id. at 2-1), the amount of lynx habitat converted to unsuitable would be much greater than the 721 acres shown in the DEIS. Id. at 3-21. The conversion to unsuitable habitat needs to be recalculated to ensure that less than 15 percent of lynx habitat would be converted to unsuitable

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via logging in a 10-year period, as required by Standard Veg S2 in the Southern Rockies Lynx Management Direction.

Damage and destruction of lynx habitat must be minimized. The best way to do that is to: a) have a much smaller project; and b) retain sizable areas of overstory with moderately dense understory, both between and within treatment units. Large open areas are known to be detrimental to lynx. See, e. g., Ruediger et al, 2000, at 7, 19. Retaining sizable areas (not just small islands) would help reduce the fragmentation of lynx habitat. It is especially important to retain, uncut, the acres removed from alternative 2 to form alternative 3, as they have been

> identified to be of highest value to wildlife as determined by field surveys completed by the ID Team Wildlife Biologist and Wildlife Field Technicians.

DEIS at 3-22. These areas have security and travel cover and the highest quality dense horizontal cover. Ibid. It also includes acreage that has no road access, so habitat effectiveness for lynx and other species would be retained if these areas are not treated.[3] Ibid. Finally, the integrity of west-to-east wildlife movement corridors across Highway 149 would be protected. Ibid.

It is important to leave coarse woody debris (CWD). Lynx use piles of logs for denning. Since trees that would otherwise fall to the ground and become piles will instead be logged under the action alternatives. Such material also provides habitat for other species like marten and slowly forms new soil. Thus it is very important that adequate CWD be retained. We recommend that any existing CWD be retained.

A Forest Plan standard requires retention of 10-15 tons per acre in spruce-fir stands. Plan at III-13. However, the project DEIS states that under alternative 2, 33 tons per acre of fuel greater than three inches in diameter would be removed, out of 35 tons expected to be present. Id. at 3-75. This would not leave sufficient CWD for lynx or other ecological functions. We recommend retaining the amount required by the Forest Plan, and that a good portion of it should be in larger diameter pieces. All existing CWD should be retained, if possible.

Effects to lynx need to be considered on the landscape scale, especially since bark beetle mortality is occurring over large areas, and projects to remove such trees over large areas are proposed as well. In addition to Black Mesa, these projects include: Big Moose, County and Line, and Cumbres, plus a number of smaller projects. We do not find this analysis in the DEIS.

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[3] Retaining various stands of dead trees would also conserve hiding cover for elk. Contrary to what is stated at DEIS p. 30, elk, after being temporarily displaced by treatment, would not come back to the area in equal or greater numbers because of increased quantity and quality of forage. Cover would be denuded because of the large areas essentially clearcut via removal of all dead or dying spruce trees. Thus elk are not likely to return for some time to some of the treated areas.

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Protecting lynx habitat would also help protect habitat for marten, as that species requires overhead cover and down dead wood for nesting and winter foraging.

III. THE EIS' RANGE OF ALTERNATIVES IS INADEQUATE. Under the Council on Environmental Quality regulations implementing the National Environmental Policy Act, "agencies shall…rigorously explore and objectively evaluate all reasonable alternatives". 40 CFR 1502.14(a).

The two action alternatives in the DEIS would cut 9410 and 6587 acres, producing 50-60 and 35-45 million board feet, respectively. Given that it is highly unlikely that anywhere near all of these acres could be cut in the near future, given current conditions (see section I above), alternatives with smaller acreages and amounts of logging are reasonable and must be analyzed in the EIS.

A smaller alternative should: 1) concentrate on removing hazard trees from areas near roads, power lines, and other infrastructure; 2) retain sizable areas of dead trees, especially where there is dense regeneration; 3) not cut the areas removed from alternative to 2 to design alternative 3[4]; and 4) allow aspen to expand naturally.[5] Such an alternative would, at least to some degree, meet the objectives listed for the project. See DEIS at 4.

IV. BOTH ACTION ALTERNATIVES WOULD TREAT AREAS ALREADY HAVING A HIGH DEGREE OF SOIL AND WATERSHED DISTURBANCE.

A. REQUIREMENTS FOR SOIL MANAGEMENT. The Forest Service's Soil Management Handbook, R-2 Supplement, states the following:

2.03 - POLICY.

[4] These areas "were determined to have the best Dense Horizontal Cover (DHC) important to lynx and other wildlife in the analysis area". DEIS at 3-4.

[5] Where present, aspen is likely to sprout in areas of spruce mortality. DEIS at 3-14. However,

> Following harvest, stands with a substantial aspen component would be evaluated to determine the desirability of planting Engelmann spruce seedlings versus allowing aspen to dominate over a longer time period in some stands or parts of stands (estimated at 2,415 acres).

DEIS at 8. We believe aspen should be allowed to regenerate.

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> 1. Management activities will be conducted in such a way as to not exceed the Soil Quality Standards. The emphasis is on protecting the soil resource before excessive damage occurs.
> 2. Where excessive soil impacts already exist from prior activity, the emphasis shall be on preventing any additional detrimental impact, and on reclamation where feasible. …
>
> 2.2 – Soil Quality Standards
>
> 3. Detrimental Compaction, Displacement, Puddling, Severe Burning and Erosion. No more than 15 percent of an activity area will be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition. This does not include the permanent transportation system. …
>
> 4. Effective Ground Cover …
>
> Standards for Detrimental Compaction, Displacement, Severe Burning, and Erosion apply to the cumulative effects of management practices over time. If a standard is exceeded in an initial entry, future entries must have no additional detrimental effect unless mitigative measures have been applied or natural recovery has taken place between entries.

FSH 2509.18, R2 Supplement 2509.18-92-1; emphasis added. It is very clear that no additional management having detrimental effects can be allowed in areas where standards are already exceeded, until mitigative measures have been applied or natural recovery has occurred.

The 15 percent standard was adopted in the Rio Grande Forest Plan:

> Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15% of any land unit (FSH 2509.18).

Forest Plan at III-10, Soil Productivity Standard 1.

B. THE PROPOSED ACTION ALTERNATIVE WOULD AUTHORIZE DETRIMENTAL ACTIVITY IN AREAS ALREADY EXCEEDING STANDARDS. Detrimental soil disturbance already exceeds 15 percent in three units. DEIS at 3-63, 3-64. If alternative 2 was implemented, disturbance in all three 7th-level watersheds of concern would increase. Two of them are already over 15 percent disturbed, and one would be just under the 15 percent standard. DEIS at 3-57.

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For alternative 3, disturbance in the 7th-level watershed of concern that is already over 15 percent would increase, and one watershed would come close to reaching the 15 percent standard. Id.at 3-58, 3-59.

Note that "[t]he detrimental soil disturbance estimates assume that BMPs would be implemented and that soil recovery would occur over time". DEIS at 3-63.

The disturbance figures cited above include those for watersheds, in which "the proposed salvage treatment acres would be heavily disturbed by skid trails and other harvest activities". DEIS at 3-56.

Implementing the project would increase the area of detrimental disturbance, violating the Soil Quality Handbook and the Forest Plan. The DEIS states (p. 3-68) that the project would comply with soil standards because project design criteria would be followed. But there is no analysis of the effectiveness of these criteria, only conclusive statements that they will be effective.

The areas and watersheds with a high level of disturbance should be avoided. This would reduce the potential for additional detrimental disturbance and reduce the cost of restoration of disturbed areas.

C. CONNECTED DISTURBED AREA MUST BE CALCULATED, DISPLAYED, AND MINIMIZED. The Watershed Conservation Practices Handbook, FSH 2509.25, section 05, defines "connected disturbed areas" as follows:

> High runoff areas like roads and other disturbed sites that have a continuous surface flow path into a stream or lake.... Hydrologic connection exists where overland flow, sediment or pollutants have a direct route to the channel network. CDAs include roads, ditches, compacted soils, bare soils, and areas of high burn severity that are directly connected to the channel system. Ground disturbing activities located within the water influence zone should be considered connected unless site-specific actions are taken to disconnect them from streams. (Citations omitted.)

The WCPH has the following design criterion concerning CDA:

> In each watershed containing a 3-rd (sic) order and larger stream, limit connected disturbed areas so the total stream network is not expanded by more than 10%. Progress toward zero connected disturbed area as much as practicable. Where it is impossible or impracticable to disconnect a particular connected disturbed area, minimize the areal extent of the individual connected disturbed area as much as

> practicable. In watersheds that contain stream reaches in diminished stream health class, allow only those actions that will maintain or reduce watershed-scale Connected Disturbed Area.

Id. at section 11.1, design criterion 1.

However, we do not find a discussion of connected disturbed area (CDA) in the EIS. It is not listed as one of the indicators for watershed condition and effects of action (DEIS at 3-42), but should be. As the DEIS notes, "[d]isconnecting…drainage from streams and routing drainage from roads through appropriate buffers is crucial to minimizing sedimentation potential". Id. at 3-55. The WCPH, section 11.1, states that "[c]onnected disturbed areas are the main source of damage in all regions". (Citations omitted, emphasis added.)

The need for disconnecting drainage from roads includes closed roads with some recovery that would be bladed and used for the project. See ibid. Commendably, a design criterion at least partially addresses this issue. It requires careful design when roads are reconstructed within 100 feet of stream. DEIS at 2-9, next to last criterion under Soil and Water Protection.

But the FEIS must show current CDA, and what it would be after implementation of each action alternative. The latter must not be more than the 10 percent limit imposed by the WCPH.

V. MINIMIZE THE IMPACTS OF TREATMENTS IN ROADLESS AREAS. Under the proposed action, 94 acres in two roadless areas would receive "limited WUI fuel treatments". DEIS at 3-87. It is important that all roadless area characteristics be retained. (See 36 CFR 294.11 (2001) for a list of these characteristics.) There should be no roads, skid trails, landings, or use of heavy mechanical equipment in the roadless areas. Slash treatment can consist of treating in place with chainsaws and scattering, handpiling and burning, broadcast burning, and/or removal using non-motorized equipment.[6]

VI. DECOMMISSION ROADS AS PART OF ANY ACTION ALTERNATIVE. Mysteriously, roads would be decommissioned only under alternative 3. Given the large amount of area disturbed from previous actions (see DEIS at 3-56 et seq.), any unneeded roads should be closed, regardless of what alternative is approved.

[6] Any kind of burning would have to be done when residents are not present, to reduce smoke problems. Also, burning would have to be carefully be designed to ensure safety.

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Under alternative 3, approximately 11.8 miles of road would be decommissioned after project completion. DEIS at 3-5. We see no reason why these same roads should not be decommissioned in alternative 2 or any other action alternative.

Roads should be obliterated, not just "decommissioned". According to the DEIS:

> Decommissioning would consist of removing culverts, installing waterbars, ripping and seeding as needed to stabilize the road surface and close them to motorized use.

Id. at 3-92. While the actions described are appropriate, we believe obliteration should also include the following, as needed: blocking the entrance to each segment to be obliterated, removing cuts and fills, transplanting seedlings and saplings onto the former road surface, and increasing law enforcement patrols in areas with recently obliterated roads.

VII. THE DISTANCE ALLOWED FOR HAZARD TREE REMOVAL IS MUCH LONGER THAN NECESSARY. Under the proposed action, hazard tree removal would be authorized per the following:

> Hazard tree removal would be implemented within a distance of 1.1 to 2.0 tree heights from open roads, fences, private land, cabins, utility lines, or other infrastructure. Hazard distance would depend on localized factors such as slope, topography, and/or the number and arrangement of potentially hazardous trees, along with the desire to avoid leaving linear corridors along infrastructure.

DEIS at 2-3.

While the distance from facilities that hazard trees need to be removed may vary slightly by terrain and other factors, we do not see why removal for a distance of twice the height of the tallest trees would ever be necessary. Removal distance of the height of the tallest tree plus 10 percent should be sufficient.

The greater the removal distance, the greater the danger of creating a linear corridor, which a design criterion requires avoiding. DEIS at 2-8.

VIII. MISCELLANEOUS

DEIS p. 3-8 states that stumps can help spread armillaria root disease, but p. 3-10 states that alternative 2 is unlikely to do so because the pathogen does not produce airborne spores. The latter is true, but stumps still help spread the disease.

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DEIS page 3-65 speaks of using fill material for temporary roads. Such roads may not be temporary, as it is usually difficult to remove fill and restore pre-construction conditions.

CONCLUSION. Given the economic conditions and the likely effects from either action alternative, a much smaller project is mandated. The DEIS must at least consider one such alternative, one that does not treat the areas removed from alternative 2 to compose alternative 3, and concentrates on removing hazard trees.

Impacts to lynx and other wildlife must be minimized. Cuts should be designed to minimize or eliminate conversion of habitat to unsuitable. Possible impacts to lynx from widespread bark beetle attacks and proposed salvage logging must be analyzed.

Areas that are already heavily disturbed should not be treated. Connected disturbed area must be calculated and kept within the limits imposed by the WCPH.

Unneeded roads should be fully obliterated in any action alternative. The distance from infrastructure for removing hazard trees should be reduced to about the height of the tallest trees plus 10 percent.

Sincerely,

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